DOCUMENT RESUME

ED 021 808 24 SP 001 581

By- Gallagher, James J.

ANALYSES OF TEACHER CLASSROOM STRATEGIES ASSOCIATED WITH STUDENT COGNITIVE AND AFFECTIVE PERFORMANCE. FINAL REPORT.

Illinois Univ., Urbana

Spons Agency- Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No- BR-5-0585

Pub Date Jun 68

Contract- OEC-6-10-196

Note- 105p.

EDRS Price MF-$0.50 HC-$4.28

Descriptors- *BEHAVIORAL OBJECTIVES, CLASSIFICATION, *CLASSROOM COMMUNICATION, *COGNITIVE PROCESSES, CONCEPT TEACHING, COURSE CONTENT, DISCUSSION (TEACHING TECHNIQUE), *EDUCATIONAL EXPERIMENTS, *INTERACTION PROCESS ANALYSIS, RESEARCH METHODOLOGY, SECONDARY SCHOOL STUDENTS, SKILLS, STUDENT BEHAVIOR, SUPERIOR STUDENTS, TEACHER BEHAVIOR, TEACHING STYLES

Identifiers- Guilford's Structure of Intellect, *Topic Classification System

This report reviews 3 demonstration studies in which the Topic Classification [illegible] and student performance) was applied to 3 samples of classroom behaviors to determine the range and limitations of the system. In the introduction the system is discussed with reference to its theoretical base (J.P. Guilford's Structure of Intellect model) and to other systems of cognitive and affective interaction analysis. Each project is presented separately: Project I which observed the patterns of thought process classification when content and concept to be taught were held constant (12 pages), Project II which studied variations that might result from different content areas (8 pages) , and Project III which compared teacher instructional strategies when variables of curriculum and concept were held constant (7 pages). In the "Conclusions" (8 pages) implications are drawn from the findings both with regard to the interaction analysis tool being tested and to junior high and high school teacher-student interaction generally. A 23-item bibliography and 14 statistical tables are included. Appendix A (42 pages), "A System of Topic Classification": "A Classroom Interaction Study" by Gallagher, et al. (1966), is ED 013 233. Appendix B (5 pages), "Classification of Topic Transitions," extends the system to cover initiation and termination of topics. (JS)

BR-5-0585
PA-24

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

FINAL REPORT
Project No. 3325
Contract No. OE-6-10-196

ANALYSES OF TEACHER CLASSROOM STRATEGIES ASSOCIATED WITH STUDENT COGNITIVE AND AFFECTIVE PERFORMANCE

James J. Gallagher

June 1968

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

ED021808

SP001581

FINAL REPORT
Project No. 3325
Contract No. OE-6-10-196

ANALYSES OF TEACHER CLASSROOM STRATEGIES ASSOCIATED WITH STUDENT COGNITIVE AND AFFECTIVE PERFORMANCE

James J. Gallagher

University of Illinois
Urbana, Illinois

June 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

LIST OF TABLES

Table Page

1. Some Representative Systems of Classroom Interaction Analysis 4

2. Topic Classification of Biological Concepts. 13

3. Reliability of Topic Classification of Biological Concepts 15

4. Performance by Classroom Groups on Dimension of Cognitive Style 19

5. Performance by Class Groups on Dimension of Levels of Conceptualization 21

6. Performance of Class Groups on Dimension of Instructional Intent 23

7. Incidence of Aschner-Gallagher Categories by Topics in Productive Thinking Sample 26

8. Topic Initiators and Terminators by Class Session in Productive Thinking Sample 28

9. Comparison of Content Field Groups on Levels of Instructional Intent 30

10. Comparison of Content Field Groups on Levels of Conceptualization 31

11. Comparison of Content Field Groups on Cognitive Style . . 33

12. Topic Initiators and Terminators by Subject Matter in Video Sessions 35

13. Percent of Topics in BSCS Sample on Goals, Levels of Conceptualization and Cognitive Style 40

14. Topic Initiators and Terminators in BSCS Scripts 41

LIST OF FIGURES

Figure Page

1. Traditional Educational Evaluation Model 2

2. Topic Classification Dimensions. 11

LIST OF APPENDICES

Appendix Page

A. A System of Topic Classification 52

B. Classification of Topic Transitions 95

Is teaching an art? Indeed, it is. Perhaps too much of one. Surgery was once too much an art and many people died as a result. Cooking is an art, and while few people die of it these days, drugstores do a thriving business in remedies for misbegotten creative culinary efforts. For when a set of skills is in a developmental stage where people say, "It is an art," they mean several things. First, that there are only a very few persons who have the skills that can identify them as highly effective practitioners, as 'artists.' Second, even these 'artists' cannot give a systematic account of how they practice their 'art,' and they are reduced to modeling their performance for those who would learn from them. But it is hard to imitate the true artist, and his genius too often dies with him.

Those interested in the improvement of education and teaching would like to remove some of the mystery of the art of effective teaching through systematic study. Earlier attempts to study educational programs adopted a type of research design that had worn well in the biological-medical setting. Figure 1 shows such a design. It is easily recognized as the way to test a new drug or cold vaccine. Two groups are selected randomly from a population to protect against sample bias, and while one group (Experimental) gets the vaccine, the other (Control) is given a placebo or pink pill to guard against recovery due to suggestion. Extensive tests are given at the post-test period to determine if the new medicine was more effective than the placebo.

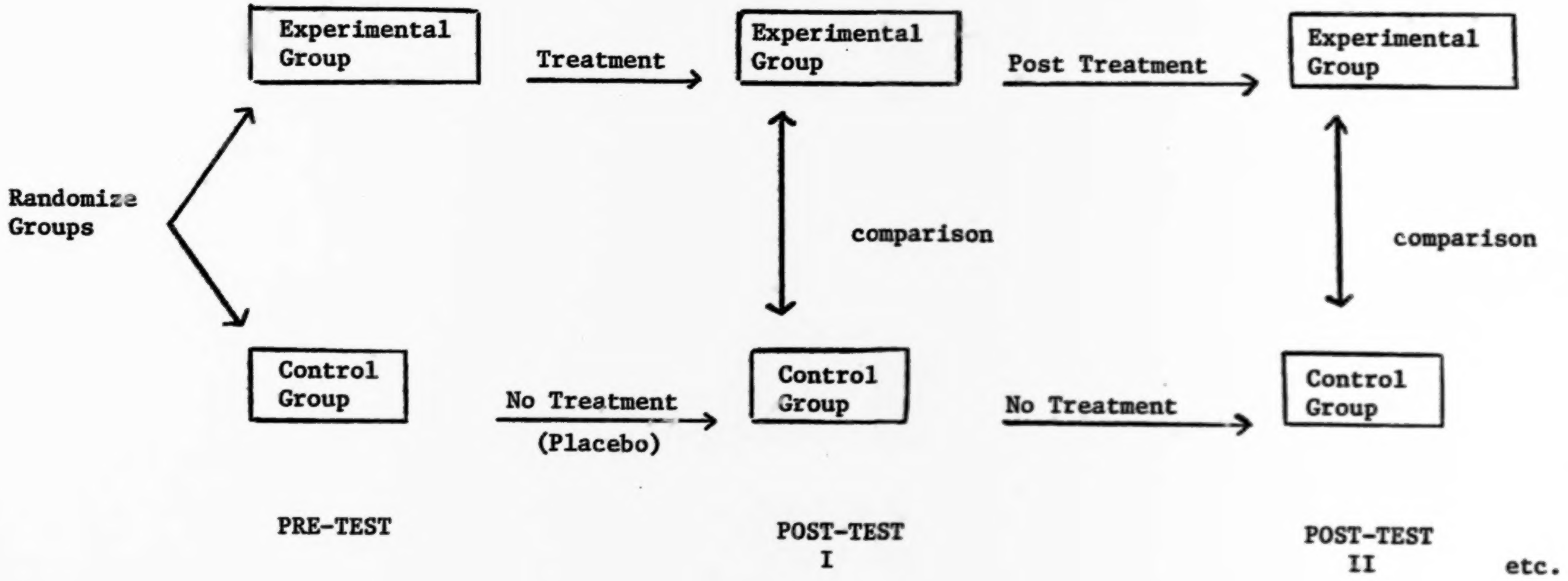
It is easy to conceive of an analogous educational study attempting to evaluate the 'new math' program. The sample is randomized, extensive tests are given to both groups before the program is instituted, and periodically after the program has been in progress. The control group continues to receive the standard program while the experimental group is immersed in the new one. While there can be a superficial analogy between the medical and educational situations, there are some good reasons why this model has little payoff for the educator who wishes to know how to improve educational programs.

The difference lies in the nature of the treatment variable. In the medical experiment there is great care taken to insure uniformity of treatment. One dose of vaccine is identical to another. But in education who can say that the 'new math' taught by Mr. Cone is the same as the 'new math' taught by Miss Ascreme? Wide treatment variation can thus be expected in the educational experiment. Even worse, can we describe the treatment at all? For the treatment turns out to be a fantastically complex set of socio-psycho-educational variables.

Psychologists have their black box in the human mind where they see stimuli go in and responses come out but can only speculate what actions and processes have occurred in between. The educator has his black box also, the classroom! Extensive investigations have been executed studying the variables going into the black box in terms of teacher characteristics, student ability and personality. Similar research has been devoted to analyzing the outcome variables of achievement and performance, all the while speculating what might be going on inside that

Figure 1

TRADITIONAL EDUCATIONAL EVALUATION MODEL


Randomize Groups
Experimental Group
Control Group
Treatment
No Treatment
(Placebo)
Experimental Group
Control Group
comparison
Post Treatment
No Treatment
Experimental Group
Control Group
comparison
PRE-TEST
POST-TEST I
POST-TEST II
etc.

black box, with little concrete results. For example, a review of the literature on teacher personality (Getzels and Jackson, 1963) yielded the following conclusion:

> Despite the critical importance of the problem and a half century of prodigious research effort, very little is known for certain about the nature and measurement of teacher personality or about the relation between teacher personality and teaching effectiveness. (p. 574)

But the educator is fortunately in a better position than the psychologist to open his black box and look inside. What he needs is a technology that will allow him to reproduce the teaching process, and he has that in audio and video tapes. He needs also some model or system by which to organize the myriad of behaviors in the classroom so that something of instructional value and theoretical significance can be deduced.

The most significant trend in recent educational research has been to abandon the study of characteristics of students and/or teachers and to begin a more effective analysis of the behavioral interaction of these individuals in the classroom setting. It is through analyses of these complex interacting behavior patterns that one may at last reach the "Holy Grail" of 'teacher effectiveness' that has so far eluded the educational investigator.

Some of the representative systems that have attempted to bring order and coherence out of the complex and multivariate environment of the classroom are noted in Table 1. These systems usually concentrate either on the cognitive or affective dimensions and have evolved from a variety of different orientations. Sometimes it will evolve from concern for logical thinking processes in the classroom as developed by Smith et.al. (1964); sometimes for a concern for classroom performance and curriculum development as with Taba, et.al. (1964); and sometimes as a concern for teacher influence on the student as with Flanders (1964).

The Affective systems, as a rule, do not relate to any larger theoretical systems. Freud and his theoretical cousins and schools are not found here. Instead, the emphasis is on observable behavior rather than inferred behavior. The systems also will differ one from another on who is being observed. In the Spaulding system it is primarily the student, whereas with the Flanders system it is primarily the teacher. It is, of course, incorrect to ask which of these systems are the best for classroom analysis. Each of these systems are tools with their own limited use and each are valuable to the extent that they match the needs of the consumer.

One of the few investigators to use a theoretical base for his observations has been Bellack (1963). He used concepts from games

Table 1

Some Representative Systems of Classroom Interaction Analyses

Reference	Appropriate Age Group	System Focus
Cognitive Systems		
Taba, Levene, & Elzey, 1964	Elementary and High School	Developed to help teachers present social studies curriculum sequence developed by the author. Can determine levels of conceptual classroom discussion and graph sequences.
Smith, et.al., 1964	High School	Develops a set of teaching behaviors labelled as *ventures* which vary according to cognitive intent of instructors. Not much attention paid to student behavior.
Bloom, et.al., 1956	High School	The taxonomy of educational objectives has been used as the basis for evaluating examination questions and as a takeoff for classroom analyses.
Other Systems: Bellack, Davitz, et.al., 1963; Suchman, 1962)		
Affective Systems		
Flanders (Flanders, 1964)	all levels	Focus on direct and indirect teacher influence such as teacher praise, criticism, or neutral response to students. Student behavior not closely analyzed.
Spaulding (Spaulding, 1965)	most useful with elementary school	A continuum of student behavior from withdrawn to aggressive which allows for analysis of behavior patterns in various classroom settings and tasks.
Medley & Mitzel (Medley & Mitzel, 1957)	all levels	A behavior schedule, OSCAR, designed to analyze classroom performance for training purposes. Contains behaviors with no particular theoretical orientation.
Other Systems: (Anderson, 1939; Hughes, 1959; Perkins, 1965; Withall, 1949)		

theory as presented by Wittgenstein to analyse fifteen classes in Problems in Democracy in the New York City Schools. The rules that he generated from his observations were as follows:

For the Teacher

1. The teacher will be the most active single person playing the game.

2. The teacher is responsible for structuring the form and content of the game. He will specify the subject matter and rules for the game.

3. The most frequent move of the teacher is called 'soliciting'. This is a directive move designed to elicit a specific response from the players called 'pupils'.

4. After making a soliciting move, the teacher will normally expect the person playing the role of 'pupil' to respond. It is then the teacher's responsibility to react to that response.

5. In addition to reacting to immediately preceding statements, the teacher is also responsible for occasional summaries of larger parts of the discourse.

6. Although either the teacher or the pupil may express substantive or substantive-logical meanings, it is primarily the teacher who is responsible for expressing meanings relevant to instructional problems.

For the Pupil

1. The pupil's primary task in the game is to respond to the teacher's solicitation. This usually involves answering specific questions posed by the teacher.

2. The pupil does not structure the game...he does not tell the teacher and other pupils what the game is to be about and how to play it.

3. The pupil will keep his solicitations to a minimum.

4. Even more important than the 'don't solicit' rule is the 'don't react evaluatively' rule. Under no condition is the pupil to react evaluatively to a statement made by a teacher; that is, the pupil does not tell the teacher he is right or wrong, that he is doing well or badly.

5. The corollary of the 'Don't react evaluatively' rule is that 'within the classroom, teachers speak the truth'.

6. The pupil is expected to perform well on the final payoff test.

Bellack points out clearly that these rules do not state how instruction should be conducted, but rather the rules seen in existing classrooms.

Gallagher-Aschner study

The present study is a logical extension of a previous research (Gallagher, 1965), in which a classification system of classroom performance (Aschner, Gallagher, et.al., 1965) was developed from the structure of intellect model of Guilford (1956, 1959) and applied to twelve separate class segments of five consecutive days each in social studies, science and English. These one hour class sessions were tape recorded and a transcription was made of the session, enriched by the notes of two observers in the classroom.

All of the classes were composed of academically talented students who were enrolled either at the junior or senior high school level. All of the 175 students were given a battery of tests measuring both cognitive and attitudinal variables and the results on these measures were compared with classroom performance. Family data were collected and similarly compared.

The system itself was built around the Operational dimensions of the Guilford system. Five primary categories were developed. These were: cognitive memory (C-M), convergent thinking (CT), divergent thinking (DT), evaluative thinking (ET), and routine (R). The routine category consisted of the familiar and conventional interpersonal maneuverings of speakers in the management activities of the classroom setting, and in a number of categories defining behaviors--verbal and otherwise--expressing affect and feeling tone.

In order that the reader have some idea of the dimensions of each of these areas of cognitive behavior in the classroom, a brief description is given below:

Cognitive-memory operations represent the simple reproduction of facts, formulae, or other items of remembered content through use of such processes as recognition, rote memory, and selective recall.

Examples of cognitive-memory performance can be seen in the following:

T: What were some of the main points covered in our discussion about mercantilism?

Mary: One of the things we learned was that there was an attempt to keep a favorable balance of trade.

T: What is a conjunction?

The above examples of teacher-student interchanges do not require the student to integrate or associate facts; the questions can be handled by direct reference to the memory bank. The sole duty of the student is to select the appropriate response from his store of remembered items.

Convergent thinking represents the analysis and integration of given or remembered data. It leads to one expected end-result or answer because of the tightly structured framework through which the individual must respond.

Examples of convergent thinking are as follows:

T: If I were going to town A 170 miles away and drove at 50 miles an hour, how long would it take me to get there?

Bob: Three hours and twenty-four minutes.

T: Can you sum up in one sentence what you think was the main idea in Paton's novel, Cry the Beloved Country?

Pete: That the problem of the blacks and the whites in Africa can only be solved by brotherly love; there is no other way.

Thus, convergent thinking may be involved in the solving of a problem, in the summarizing of a body of material, or in the establishment of a logical sequence of ideas or premises--as, for example, in reporting the way in which a machine works, or in describing the sequence of steps by which the passage of a bill through Congress is accomplished.

Divergent thinking represents intellectual operations wherein the individual is free to generate independently his own data within a data-poor situation, or to take a new direction or perspective on a given topic.

Examples of divergent thinking are:

T: Suppose Spain had not been defeated when the Armada was destroyed in 1588, but that instead, Spain had conquered England. What would the world be like today if that had happened?

Sam: Well, we would all be speaking Spanish.

Peg: We might have fought a revolutionary war against Spain instead of England.

Tom: We might have a state religion in this country.

These examples represent teacher-stimulated divergent thinking, but it need not always be teacher-generated. In a regular discussion of the "spoils system," a student may come up with the following:

> Well, sure, the spoils system might be a good thing when a political party is getting started but what about when there's no party system--like in the United Nations?

Here the student reveals his ability to take off from an established fact or facts and see further implications or unique associations that have not been requested or perhaps even thought of by the teacher. Instances of this type of self-initiated student behavior would also fall under the general category of divergent thinking.

Evaluative thinking deals with matters of judgment, value, and choice, and is characterized by its judgmental quality. For example:

T: What do you think of Captain Ahab as a heroic figure of Moby Dick?

Bob: Well, he sure was brave, but I think he was kind of mean the way he drove the men just because he had this crazy notion of getting back at Moby Dick.

T: Is it likely that we will have a hard winter?

Mary: Well, I think that the pattern of high pressure area suggests that we will.

T: Who was the stronger President, Jackson or Adams?

Mike: Adams.

In the first of the above examples, the student is asked to construct a value dimension of his own in terms of what he considers "heroic," and then to make a judgment as to where on his value dimension he would place Captain Ahab. In the second response, the student is asked to make an estimate or to give speculative opinion or assessment of probability. A third possibility involves entering a qualification or disagreement, wherein the respondent would offer a modification of a prior judgment of another student; or he may state a counter-judgment, in which he declares direct opposition to the statement of the previous speaker.

The final category, Routine, contains a large number of miscellaneous classroom activities. Included here are the attitudinal dimensions of praise and censure of others and of self. Also present are dimensions of structuring, a kind of prefatory remark, telling in advance what the speaker intends to say or do, or what he expects someone else to say or do. Other characteristic occurrences, such as humor, as well as the ordinary "routine" classroom management behaviors--even to request to close the door or asking what time it is--are included in this primary category.

As in most studies, the shortcomings of the measuring instruments were not fully revealed until the study itself was completed. The flaws in the Aschner-Gallagher system were noted as follows:

> The classification system itself appears to be a potentially useful tool in describing teacher and student behavior and in categorizing differences among students and among teachers....
>
> Not all teacher or student behaviors are equally important to the conduct of the classroom or to the advancement of curriculum goals. There appear to be critical incidents, certain choice points ... an attempt to locate such choice points is one logical extension of the present study. (Gallagher, Aschner and Jeene, 1967, pp. 96-97.)

The major results of that study may be summarized as follows:

1. Cognitive memory questions made up 50% or more of the questions asked by teachers in practically all sessions.

2. There were relatively few evaluative and divergent thinking questions asked and in some class sessions they were entirely absent.

3. Teacher questions appeared to be the teacher's method of advancing class discussion, whereas teacher statements reflected the teacher's individual cognitive style.

4. A close relationship was noted between the type of teacher questions asked and the nature of the thought expression of the students. The style of verbal expression within the classroom was clearly determined by the teacher.

5. Teachers showed marked variation within their own pattern and these variations appeared to be due to (a) the group of students (b) teacher's goals and (c) degree of class progress to those goals.

6. Student expressiveness in the classroom as an individual characteristic was consistent despite changes in subject matter, teacher and time.

7. There was a close correspondence between student performance in all categories of cognitive performance.

8. Boys generally appeared to be higher in classroom expressiveness than girls and showed more self confidence in their own abilities. The girls were more positive towards the world around them.

Gallagher concluded that the findings confirmed previous observations as to the crucial role played by the teacher as the initiator and determiner of the kinds of thought processes expressed in the classroom. It was the teacher's questions that determined the focus of the classroom operation, and the style of question asking determined the kind of thought operation that the student would be asked to perform. While the classification system used in the study appeared a useful first step Gallagher felt that additional development in terms of larger units of measurement was needed to provide a satisfactory account of classroom strategy and interaction.

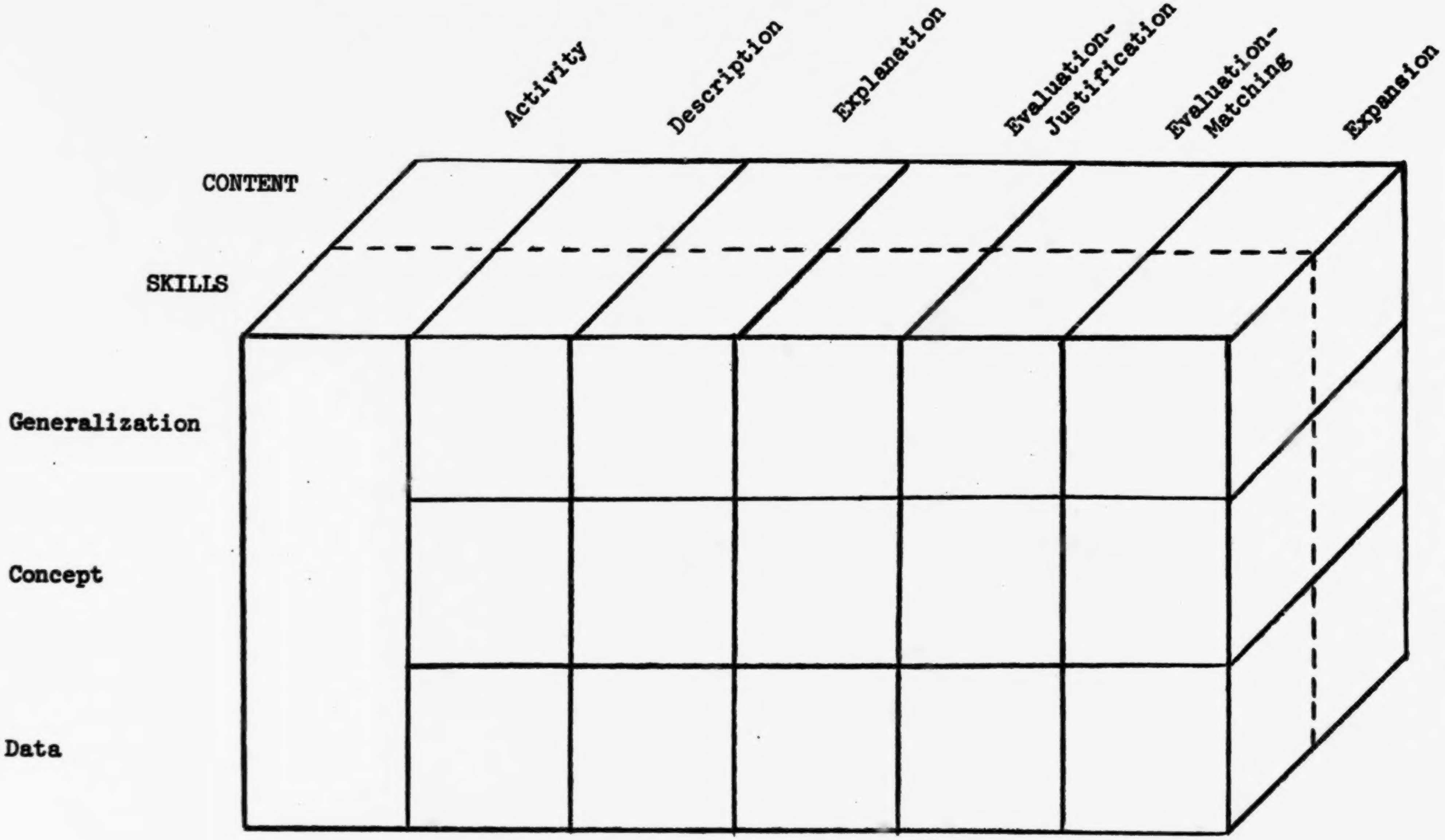
The Topic Classification System

The present topic classification system (Gallagher, Shaffer, et. al., 1966) was developed out of the experience with the system described in the preceding section. The purpose of this system is to indicate the level of conceptualization, the style of thinking and the instructional intent in classroom discussion. Figure 2 gives a schematic picture of the three dimensions in this system which allows the investigator to analyze sub-units called topics in terms of instructionally relevant variables.

In this system the term Topic is used to delineate a unit where the focus of classroom discussion centers on a given action, concept or principle. Classroom discussions do not necessarily follow orderly sequences. Therefore, the length of time spent on a subject under discussion determines its status as a Topic, rather than the place it might or might not hold in an orderly or logical sequence!

In a given one-hour class session, one normally expects to find between 15 and 25 Topics. These, in turn, may be grouped under larger

Figure 2. Topic Classification Dimensions


Activity
Description
Explanation
Evaluation-Justification
Evaluation-Matching
Expansion
CONTENT
SKILLS
Generalization
Concept
Data

headings entitled Themes. A Theme is a unifying element for a group of related topics. One would generally expect to find one to four themes for a one hour's script.

Instructional Intent. This dimension refers to two distinctly different teaching goals. Content refers to the goal of injecting a given body of knowledge into the student. Information, ideas, or concepts are presented to the student and he is expected to absorb them.

The second area, Skills, refers to the goal of teaching the student a set of behaviors or skills which will enable him to master situations that he will meet in the future. Such activities as instruction in reading skills, learning grammatical rules, mastering mathematical operations, learning the scientific method are referred to as Skills.

Level of Conceptualization. One weakness of many previously constructed classification systems has been a lack of consideration for the level of conceptualization of the classroom interchange. In a curriculum where the importance of an idea is judged crucial, a classification system should indicate whether or not the class is generally operating on a high or low abstract level. The three levels utilized in the present system are crude and a deliberately limited view of a more infinitely complex abstractional ladder. Data represents the discussion of specifics, the individual event or instance, the personal anecdote, the concrete level of happenings. Concept represents a certain degree of abstraction of data to general ideas and their applications or associations. Generalization represents the larger ideas or concepts in relationship to one another as found in a scientific law or the general principles of economics or history.

Style. This dimension deals with the style of thinking evident in the discussion held in the classroom. It focuses on how information is being processed. It is this dimension that maintains the theoretical concepts of Guilford. The focus of a topic in a class session can be on Description, or the defining or describing of aspects of a concept or event; on Explanation which would focus on reasoned argument through sequential deductive steps of thinking; on Expansion which leads the group off in other lines of thinking or on new associations; on Evaluation-Justification, which reveals an attempt to make a decision and then explain the reasons for the judgment; on Evaluation-Matching, which depends upon the presence of previously established criteria for judgment and attempts to match events or circumstances to those criteria. The sixth category, Activity, merely depicts student activity other than discussion, such as doing written exercises, conducting an experiment, etc.

Each topic is classified in the three dimensions. Thus, a topic whose focus would be on the definition of an autotroph would be CONTENT - CONCEPT - DESCRIPTION. A topic whose focus would be on how to record data stemming from a class laboratory experiment would be SKILLS - DATA - EXPLANATION, and so forth.

Table 2

TOPIC CLASSIFICATION OF BIOLOGICAL CONCEPTS

	DESCRIPTION (D)	EXPANSION (E)	EXPLANATION (X)	EVALUATION (V)
GENERALIZATION	The system of photosynthesis.	What would happen if the system of photosynthesis ceased functioning?	Show how the system of photosynthesis explains the change in leaves from brown to green.	Does this represent an adequate statement for photosnythesis? $CO_2 + H_2O \rightarrow [CH_2O] + O_2$
CONCEPT	The definition of a heterotroph.	Contrast the autotroph and the heterotroph.	How do we know that the oxygen from photosynthesis comes from water?	Do you believe it was essential that autotrophs developed?
DATA	What colors do you see in the spectroscope? Record them.	Comparing the black vs. white cloths their ability to absorb light.	Describe in sequence the experiment by Calvin.	Was our experiment a success?

Table 2 gives some examples of topics that would fall into various cells of the present classification system. By following the columns up in Table 2 the reader can grasp the change in abstraction level. By following the rows across one can see the change in style and emphasis. The Content vs. Skills dimension is not included in this table. One example of this distinction would be:

Skills - The description of a microscope and how it is to be used in collecting observation.

Content - The discussion of the history of the microscope and its invention.

Reliability. In applying the classification system to the scripts in the present study, a procedure was followed that had been found workable in the previous research project (Gallagher, 1965). Two judges would independently rate each script, first making topic divisions and then classifying. These judges then would consense their decisions on classification. If any decisions remained unresolved as a result of this consensus meeting they were brought before the total staff for discussion. Consistent differences were used for modification or extension of established rules.

It was found necessary to consistently use two judges since it was difficult to keep a consistent frame of reference on the entire system. The consensus helped iron out tendencies to overlook a category or overemphasize a category during a classification session. Reliability in this case is not determined by a comparison of the two individual judges but rather between two teams of judges operating in this fashion.

The reliability of the system was determined by comparing the total results of two teams of judges over the same set of scripts. Table 3 indicates such a comparison. Three scripts were chosen that had previously been classified by a team in 1966, and were classified again in 1967 with a new team of judges. The results obtained from a comparison of teams on script analysis may be noted in Table 3. There was quite close correspondence between the teams of judges on the three dimensions on the basis of total percentage scores. The difference in the total number of topics comes from certain disagreements in the teams as to where topics should be divided, or whether topics were actually present or not. While these results are quite favorable it should be emphasized that they were obtained only after these teams had worked together for some time and had become very familiar with the system. No such close correspondence would be expected from novice groups until some training were effected so that consistent disagreements would be identified and corrected.

Another question that was raised was whether or not it was possible to adequately classify a classroom session from an audiotape rather than from a written script. The preparation of a tapescript from a one hour session is a laborious and time consuming activity and if appropriate classification could be obtained by listening to tapes

Table 3

Reliability of Topic Classification System by Scripts and by Listening

	Scripts (Uriah, Willie, Zorba I)				Script or Audiotape (Uriah, Willie, Zorba II)			
	1966 Team		1967 Team		1966 Team		1967 Team	
	No. Topics	%	No. Topics	%	No. Topics	%	No. Topics	%
CONTENT	43	92	40	91	53	90	64	96
SKILLS	4	9	4	9	6	10	3	4
DATA	13	28	11	25	7	12	15	22
CONTENT	32	68	30	68	50	85	50	75
GENERALIZATION	2	4	3	7	2	4	2	3
DESCRIPTION	11	23	12	27	27	46	33	49
EXPLANATION	27	57	26	59	18	31	21	31
EVALUATION	2	4	4	9	3	5	4	6
EXPANSION	7	15	2	5	11	19	9	13

much secretarial time could be saved. This would be particularly valuable if the purpose was to use the system for teacher training rather than for research.

Table 3 shows a comparison on three other class sessions in which one team operated from a set of three scripts while another team listened to the audiotapes of the same classroom sessions. The results are shown in Table 3 and again show satisfactory correspondence. Listening to the scripts took longer and were, in the opinion of some judges, rather tiring compared to working with the written script. It was interesting to note that there were some advantages to listening as well. Topic divisions were often easier to identify through the voice inflection that was lost in the written scripts.

At any rate, these results would tend to show that teams of well trained judges can achieve satisfactory agreement on the major dimensions of the Topic Classification System when compared by script, or by one team listening and another working from a script.

PROJECT I

TOPIC CLASSIFICATION IN PROGRAMS FOR GIFTED STUDENTS

The purpose of the present research program was to develop a system of classroom interaction that would identify and classify significant incidents or units in the classroom (in this case labelled *topics*) in order to analyse various teacher strategies. Once the system was developed, a further goal was to apply the system to various samples of classroom behaviors in order that the range and limitations of the system be determined.

Three separate samples were selected for the Topic Classification System demonstration. Each of these samples has its own separate students, procedures, and analysis, and are present here in separate sections as demonstration studies.

The previous research project that this sample was drawn from (Gallagher, 1965) was reported on in an earlier section of this report. The basic purpose of that earlier study was to identify and classify productive thought processes and assess the relationships between these classroom expressed thoughts and other variables believed to influence their expression in the classroom.

Subjects. The subjects in the Productive Thinking Study were 115 boys and 117 girls enrolled in ten classes for gifted students at the junior and senior high school level. Each student was chosen for membership in these special class groups on the basis of group IQ scores and proven academic attainment. The mean verbal IQ for the boys was 131; for the girls, 128. Since group IQ scores were used for selection, and these scores are often found to be lower than scores obtained on individual intelligence tests by gifted students, it was assumed that these groups represented at least the top five percent of their age group on effective intellectual performance. A more extensive description of this group is available in the previous report. Extensive data were collected on these students in the prior study. Among these were some Guilford tests of divergent thinking, tests of attitude and self concept, teacher ratings and parent interviews.

Procedure. Each of the ten classes were tape recorded for five consecutive one hour sessions (two classes were taped in the fall and again in the spring to check on classroom consistency). In addition to the tape recordings, two observers were present in the classroom and took extensive notes on classroom activities such as demonstrations, charts, blackboard material, etc. In addition, they noted the more obvious attitudinal relationships or actions within the classroom such as censure, praise, frustration, humor, etc. Each transcribed classroom session was classified statement by statement by trained judges working with the scoring manual described above.

For the Topic Classification System study, the typed scripts of the previous research were used and the new judges divided these scripts into *topics* and then classified them according to the new system. These judges had no previous knowledge of the prior classification of the scripts via the Aschner-Gallagher system. They again performed as two man teams, consensing their judgments to produce a final classification. Additional analyses were done using some of the data on individual children collected in the previous study.

Results.

Cognitive style. Table 4 shows the performance by class groups on the dimension of cognitive style. An analysis of variance was calculated on each of the major style dimensions with the sources of variance examined being the teacher, the class section and the days of the week, since there were five consecutive days of recording. The results of the analysis of variance indicate that teacher variance was a significant factor in each of the style dimensions. In other words, the proportion or distribution by teacher of topics appearing in each set of classes were significantly different from one to another.

In the case of EXPLANATION topics, significant variance was also found due to the class session suggesting that the amount of EXPLANATION topics present on any particular day varied, according to the teacher plans for that day. (The previous study had shown heavy teacher domination over classroom direction.) Significant variation was found also due to the interaction of Teacher and Class Session suggesting that certain teachers varied the topics in their classroom by session, whereas others did not.

In the case of the EVALUATION topics, significant variance was also found between class sessions. An examination of Table 4 reveals one striking difference between class sessions of the same teacher which would appear to account for this difference. The teacher with [illegible] and [illegible] sections revealed a 37% of topics for EVALUATION in one section and only 10% EVALUATION topics for the second section. In the first instance the teacher chose a particular teacher strategy of having the students choose between alternatives rather than reason through to a final conclusion to explain the results of an experiment and this accounted for the major differences between the two class sections.

Significant variation was found again in the interaction of teacher and session on EVALUATION topics. This would indicate that certain teachers varied from day to day on the number of evaluation topics appearing in the classroom. On EXPANSION topics differences were found only on teacher variation.

The wide variation between teachers in the percentage of certain style topics is readily evident in Table 4. The proportion of DESCRIPTION topics present range from a high of 60% in [illegible], to a low of 17% in section [illegible] with an average of 30% of the total topics. It is interesting to note that the two teachers at the extremes in the use of DESCRIPTION topics were both science teachers. In one case, however, the emphasis was on the definition and classification of biological concepts, and in the other upon experimentation and the drawing of conclusions from the experiments. This result is noted in the high percentage of

Table 6

Performance by Class Groups on Dimension of Cognitive Style

STYLE

CLASS	DESCRIPTION # TOPICS	DESCRIPTION %	EXPLANATION # TOPICS	EXPLANATION %	EVALUATION # TOPICS	EVALUATION %	EXPANSION # TOPICS	EXPANSION %	TOTAL TOPICS
[illegible]	29	34	25	29	16	19	15	18	85
[illegible]	37	46	16	20	11	14	17	21	81
[illegible]	51	60	24	28	6	7	4	5	85
[illegible]	62	59	34	32	7	7	2	2	105
[illegible]	11	15	34	47	27	38	0	0	72
[illegible]	11	17	35	54	9	14	10	15	65
[illegible]	31	42	10	14	28	38	5	7	74
[illegible]	40	53	11	15	18	24	6	8	75
[illegible]	23	34	4	6	40	59	1	1	68
[illegible]	15	20	12	16	36	48	12	16	75
TOTAL	310	39	205	26	198	25	72	9	785

ANALYSES OF VARIANCE

SOURCE	SS	d.f.	MS	F	SS	d.f.	MS	F	SS	d.f.	MS	F	SS	d.f.	MS	F
TEACHER	497.40	4	124.35	17.66**	209.80	4	52.45	19.28**	224.52	4	56.13	11.24**	41.32	4	10.33	3.95*
CLASS	8.00	1	8.00	1.14	2.42	1	2.42	.89	25.92	1	25.92	5.19*	9.68	1	9.68	3.70
SESSION	19.40	4	4.85	.69	72.40	4	18.10	6.65**	10.32	4	2.58	.52	13.32	4	3.33	1.27
T × C	25.00	4	6.25	.89	22.28	4	5.57	2.05	20.68	4	5.17	1.04	13.32	4	3.33	1.27
T × S	158.20	16	9.89	1.40	194.80	16	12.18	4.48**	354.08	16	22.13	4.43**	24.68	16	1.54	.59
C × S	7.40	4	1.85	1.05	23.28	4	5.82	2.14	14.48	4	3.62	.72	12.12	4	3.03	1.16
T×C×S	112.60	16	7.04	.26	43.52	16	2.72		79.92	16	5.00		41.88	16	2.62	
TOTAL	828.00	49			568.50	49			729.92	49			156.32	49		

*p ≤ .05
**p ≤ .01

EXPLANATION topics in FOX and GEORGE. The English teacher had the lowest number of EXPLANATION topics as might be expected, and the highest percentage of EVALUATION topics.

EXPANSION topics show the lowest topic incidence (9%) of the different styles, not even appearing in section FOX, and only once in five days in section JACK. It is apparent that some teachers can conduct instruction without drawing upon the EXPANSION type of topic. Since this topic style would seem to relate more closely to innovative or creative work, it would seem necessary to spend time to instruct explicitly teachers in how to initiate such topics if they are to appear in class discussion in the classroom.

Levels of Conceptualization. Table 5 shows the performance of class groups on the second dimension of the Topic Classification System, the levels of conceptualization. In the comparison of topics across class groups, one is impressed by the range of DATA topics in the ten sessions, with the lowest incidence being found in class group Fox with 18% DATA topics, and the highest incidence found in class group Idea with 69% DATA topics.

There was also a difference in the percentage of DATA topics between sections taught by the same teacher using the same general subject matter. For example, while section Baker had only 23% DATA topics over the five day period, Charlie section, covering the same content, had 44% DATA topics. While Hat section had 25% DATA topics, Idea had 70% topics. To have such a variation in the levels of conceptualization when the same teacher is teaching the same subject matter is surprising and has implications for teacher training and classroom research. The analysis of variance done on the DATA dimension reveals, as might be expected, significant variation in topics at the levels of conceptualization due to teacher, class section and the particular class session.

One observation on this data is that the teacher is forced to place emphasis on DATA topics when the students in the class are not well prepared, or need further groundwork before moving to a higher conceptual level. It also indicates that the students tend to determine the conceptual level of discussion in the classroom by their own level of preparation. If they come to the classroom ill-prepared, by background or lack of study, they may well force the teacher into a greater emphasis on the area of DATA or concrete information than the teacher may himself wish to do.

Table 5 shows that the majority of topics, 57%, were at the CONCEPT level. However, there remains a considerable range between classes, with 28% of the topics in Idea being at this level while 82% of the topics in Fox were at this level. The content difference between these two classes were that in Idea there were considerable discussion being held on the concrete events surrounding the establishment of various colonies in pre-Revolutionary America. In the Fox science section the students were discussing the properties of electrons without too much concern with the properties of any individual electron. In short, we again get some insight into the natural pull of a particular subject matter in terms of the conceptual level of discussion in the classroom.

Table 5

Performance by Class Groups on Dimension of Levels of Conceptualization

LEVELS OF CONCEPTUALIZATION

CLASS	DATA # TOPICS	%	CONCEPT # TOPICS	%	GENERALIZATION # TOPICS	%	TOTAL
BAKER	20	23	55	65	10	12	85
CHARLIE	36	44	43	53	2	2	81
DAN	26	31	59	69	0	0	85
EAST	26	24	77	73	2	2	105
FOX	13	18	59	82	0	0	72
GEORGE	15	23	44	68	6	9	65
HAT	19	25	39	53	16	22	74
IDEA	52	70	21	28	2	2	75
JACK	46	68	21	27	1	1	68
KING	46	61	26	35	3	4	75
TOTAL	299	38	444	57	42	5	785

ANALYSIS OF VARIANCE

SOURCE	SS	df	MS	F	SS	df	MS	F	SS	df	MS	F
TEACHER	224.89	4	56.22	9.34**	509.08	4	127.27	7.32**	17.12	4	4.28	2.92
CLASS	52.02	1	52.02	8.64**	96.80	1	96.80	.56	2.88	1	2.88	1.96
SESSION	197.48	4	49.37	8.20**	60.48	4	15.12	.87	4.12	4	1.03	.70
T x C	82.88	4	20.72	3.44*	94.52	4	23.63	1.36	27.52	4	6.88	4.69*
T x S	233.12	16	14.57	2.42*	351.72	16	21.98	1.27	27.48	16	1.72	1.17
C x S	28.28	4	7.07	1.17	93.92	4	23.48	1.35	4.12	4	1.03	
TxCxS	96.32	16	6.02		277.88	16	17.37		23.48	16	1.47	
TOTAL	914.98	49			1397.28	49			106.72	49		

*$p \leq .05$
**$p \leq .01$

It would seem, on the basis of these results, that the CONCEPT level, or the discussion of ideas without major concrete referents, represents the common currency of classroom discussion at this age level with students of superior ability. For younger children, or children of lesser abilities, the proportions of topics would tend to move in the direction of greater numbers of DATA topics.

At the CONCEPT level the analysis of variance again indicates a significant difference between teachers, but no significant variance due to class sections or class sessions. Naturally, these results on the CONCEPT level are tied to the results on data and generalization since they are all a part of the same five sessions class sample.

One of the probable instructional goals of teachers of talented students of junior or senior high level is to bring forward, in class discussions, high level generalizations or conceptual systems. One would not expect, even under the most favorable circumstances, a large proportion of GENERALIZATION topics since it is very difficult to maintain this high level of thinking in a discussion for any length of time. It represents instead an apex in the thought interchange or the broad idea initiating a discussion which then must be surrounded by the foundation blocks of data and concepts.

Nevertheless, it is discouraging to find in Table 5 such a very small percentage of topics related to GENERALIZATION. In two class sections the percentage of incidence is zero. In only two classes did the topic percentage get above 10%. Both of these classes were discussing social studies. The reason for the high percentage in Hat class section was that the content of the class was focused on finding a GENERALIZATION that would fit all kinds of colonies in all eras and circumstances. This was a major instructional goal of the teacher. The great attention paid to this central theme was responsible for the high percentage of GENERALIZATION in this classroom. In this instance, probably due to the low total incidence, the analysis of variance did not show significant variation due to the teacher, but the results did approach the .05 level of significance.

Instructional Intent. Table 6 indicates the total number of topics in the ten class groups that were classified in the instructional intent dimensions as either CONTENT OR SKILLS. If a topic was classified as SKILLS, this would indicate that specific and explicit attention was paid towards getting a student to learn how to study or approach the subject matter, as opposed to learning specific elements of the subject matter itself.

From Table 6 it is evident that the vast majority of topics (93%) fell into the area of CONTENT. For instance, out of the total of 8 topics in Baker class group, all of the topics were emphasizing CONTENT. In only three of the ten class groups were there 10% or more of SKILLS topics. The total SKILLS topics for the entire sample was only 7%.

An analysis of variance examined the question of whether significant variance in instructional intent could be attributed to the particular teacher, to the class section or the class session. In bot

Table 6

Performance by Class Groups on Dimension of Instructional Intent

INTENT

CLASS GROUP	CONTENT # TOPICS	CONTENT %	SKILLS # TOPICS	SKILLS %	TOTAL
BAKER	85	100	0	0	85
CHARLIE	76	99	1	1	77
DAN	79	93	6	7	85
EASY	95	90	10	10	105
FOX	70	97	2	3	72
GEORGE	61	94	4	6	65
HAT	71	96	3	4	74
IDEA	73	97	2	3	75
JACK	53	78	15	22	68
KING	64	85	11	15	75
TOTAL	727	93	54	7	781

ANALYSES OF VARIANCE

SOURCE	SS	d.f.	MS	F	SS	d.f.	MS	F
TEACHER	207.72	4	51.93	3.29*	34.52	4	8.63	8.46**
CLASS	2.42	1	2.42	.15	.72	1	.72	.71
SESSION	89.72	4	22.43	1.42	10.92	4	2.73	2.68
T x C	51.88	4	12.97	.82	5.48	4	1.37	1.34
T x S	447.48	16	27.97	1.78	61.28	16	3.83	3.76**
C x S	89.08	4	22.27	1.41	1.48	4	.37	.36
TxCxS	252.12	16	15.76		16.32	16	1.02	
TOTAL	1140.42	49			130.72	49		

*$p < .05$
**$p < .01$

of the dimensions of instructional intent the teacher provided the most significant variance contribution. The English teacher in Jack and King sections gave more attention to SKILLS topics than did either of the social studies teachers or the science teachers. This raises an interesting question as to whether these differences observed here really relate to the subject matter itself. English by its very nature would seem to have a greater expectation of SKILLS topics than other content fields. For example, the teacher's major emphasis in this English class was on how to organize or outline paragraphs.

Similarly, if we were to analyze mathematics classes we would expect to find more SKILLS topics merely because it is the expected focus of mathematics classes that the student should learn SKILLS. Whether this should be the orientation in social studies classes is an interesting question. It does not seem to be a current expectation if these teachers are any example.

The analysis of variance also revealed a significant interaction between teacher and class session. This represented teacher variation from day to day in some of the classes in the request for SKILLS. As with the level of conceptualization findings these results would indicate that explicit instruction of the teacher will be needed if SKILLS topics are to be found in the classroom in subject areas such as science and social studies.

Incidence of Categories. Table 7 presents the ranking of the incidence of occurrence of various categories in the Aschner-Gallagher system in the various topics as they are categorized in the new Topic Classification System. All of the responses were categorized by the Aschner-Gallagher system (done in a previous study) and these were summed by topic classification. That is, if a topic were called DESCRIPTION all responses would be added within that topic to see which of the previous categories was dominant in each topic.

For example, it was found that when all of the topics labelled DESCRIPTION were studied, and the individual classifications of the previous system summed in all classrooms, Cognitive Memory statements were the most frequent, while the Convergent Thinking type of statements were next.

The same general relationship held as well for the other topics. For example, in EVALUATION topics in the five sets of classrooms we find the Evaluative Thinking is not the most predominant category in an EVALUATION topic but instead that the Cognitive memory category is still first! Similarly with EXPANSION topics in the five sets, the Divergent Thinking category is first in frequency in only one set of classrooms while Cognitive Memory statements retain their relative majority in all of the others.

What this apparently means is that factual material, as categorized under Cognitive Memory, is the predominant feature of any discourse, if frequency count is the indicator used. Even those topics called EVALUATIVE or EXPANSION are still infused by factual statements. It is all the more important, therefore, to realize that a strict frequency count will not do justice to the shifting and changing cognitive environment as found in the classroom and that some type of system such as the Topic Classification System is necessary to highlight the themes or critical incidents that, in actuality, change and shape the instructional sessions.

Initiators and Terminators. Table 8 shows the results on the topic initiators and terminators for the productive thinking sample. In the initiators the total figures reveals that the most predominant topic initiator is the teacher question, with more than half of the total topics beginning in this fashion. The total student initiation shows that 11% of the topics were begun by student questions and 18% by student statements. Actually, the percentages for the student statement initiation are undoubtedly inflated. In the BAKER-CHARLIE and the HAT-IDEA social studies series there were some student reports on

Table 7

Incidence of Aschner-Gallagher Categories by Topics in Productive Thinking Sample

	TOPICS			
	Description	Explanation	Evaluation	Expansion
COGNITIVE MEMORY	1,1,1,1,1	1,1,1,1,1	1,1,1,1,1	2,1,1,1,1
CONVERGENT THINKING	2,2,2,2,2	2,2,2,2,2	2,2,2,2,2	3,2,2,2,2
DIVERGENT THINKING	3,4,3,4,4	4,3,3,4,4	3,4,4,3,4	1,3,3,4,4
EVALUATIVE THINKING	4,3,4,3,3	3,4,4,3,3	4,3,3,4,3	4,4,4,3,3

various colonies as part of the assignment. When each student began his report this was classified in the analysis as initiated by student statement; however, the entire series of reports was engineered by the teachers, and the students were really following teacher direction with each student in turn reporting. There would be some question as to how legitimate it is to call this type of activity student initiation.

Only 11% of the topics were initiated by student questions and this showed again the acceptance of the teacher's role of engineering the class sequence of activities and discussion. It is likely that students begin substantially less than one out of every four topics in classroom instruction. Is this good or bad instructionally? It obviously depends on your point of view. If you are in favor of well organized class discussions that move in orderly fashion from one point to another then, the fewer student questions the better, because they tend to sidetrack and distract the neat outline of the teacher. If one is seeking an actively participating student whose own curiosity may throw a conceptual monkey wrench into the discussions then one would seek more student participation, particularly among these gifted students who have the ability to organize their thoughts and ideas if given a chance.

In view of the high rate of teacher engineering shown in topic initiation one would expect to find a similar situation in the topic terminators. In this instance, a judgment was made as to whether there was an identifiable summary or drawing together of the ideas before the discussion went on to the new topic. In 23% of the topics an identifiable summary was found and in 20% of the cases the teacher did the summarizing. This would indicate again the generally passive role accepted by the student who presents facts but who is not expected to do the more intellectually demanding task of integrating or summarizing ideas. This is the role of the teacher in these classrooms examined here. In four of the classrooms no student summaries were found in the scripts at all. The lowest percentage of teacher summary was found in the Fox-George set which confirmed the observations of the persons sitting in the classroom that the class discussion had little form to it and seemed to move from one point to another with little conceptual glue holding the topics together.

In summary, it can be said that whoever controls the initiation and termination of topics controls the classroom discussion or intellectual interchange. It is clear that the teacher does this and it appears to be expected by tradition by both teachers and students. Student initiative here is limited to bringing up isolated points and does not challenge, or think of challenging, the discussion structure or purposes of the discussion itself.

Table 8

Topic Initiators and Terminators by Class Sessions

	Topic Initiators								Topic Terminators						
CLASS UNIT	Student Question		Student Statement		Teacher Question		Teacher Statement		Student Summary		Teacher Summary		No Summary		Total
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
BAKER	9	11	18	22	42	51	13	16	7	8	25	31	50	61	82
CHARLIE	15	20	17	23	32	43	11	14	4	5	18	28	53	67	75
DAN	1	1	2	2	53	67	24	29	0	0	12	15	68	85	80
EASY	10	11	2	2	63	65	20	21	1	1	14	15	80	84	95
FOX	13	16	6	8	38	66	8	10	7	9	7	9	51	82	75
GEORGE	7	13	9	16	26	46	14	25	0	0	4	7	52	93	56
HAT	3	5	31	46	21	32	11	15	2	3	9	14	55	83	66
IDEA	3	5	35	52	24	36	5	8	2	3	14	21	51	76	67
JACK	1	2	5	10	34	67	12	23	0	0	8	16	44	84	52
KING	14	22	2	3	36	55	13	20	0	0	24	36	41	64	65
TOTAL	76	11	127	18	369	52	131	19	23	3	135	20	545	77	703

PROJECT II

A COMPARISON OF TOPIC CLASSIFICATION
ACROSS CONTENT AREAS

The previous section has dealt with the patterns of Topic Classification when the content and concept to be taught were held constant. In this particular study we are interested in variations that might appear as a function of a particular content area.

Sample. This sample of thirty classroom sessions was obtained through the process of videotaping several demonstration classes of over 100 academically superior children brought together as part of a training workshop for teachers of gifted students conducted at the University of Illinois in the summer of 1965. The students in the demonstration classes had been previously enrolled or scheduled for enrollment in programs for gifted students in the State of Illinois and came to the workshop with high ability and high achievement credentials.

The workshop drew its teacher participants from special State Demonstration Centers for Gifted Children. The teachers from these Demonstration Centers had previous successful instructional experience with gifted students. In addition to instruction on teaching methods and strategies, they became familiar with special curriculum programs in English, Science and Social Studies being developed at University High School in Urbana. The instructional process most favored in the workshops was the discovery method or inductive teaching where the student is expected to play an active role in discovering the major ideas, or systems of ideas, that are being presented. One section was composed of elementary school teachers and the material presented in that demonstration class represented a mixture of content areas common to the upper elementary grades.

Procedure. As part of the training program of the teacher workshop, each of the teachers had one or more instructional sessions with the demonstration classes of gifted students placed on videotape. These videotapes were collected over four different content areas: social studies, language arts, science and general elementary school instruction. These provided the investigators with the raw material upon which to apply the new Topic Classification model described in the measurement section.

At first, attempts were made to classify scripts by merely viewing a reply of the videotape, but these attempts were soon abandoned as it became clear that the total structure of the classroom operation could not be quickly analyzed through a single viewing, and that a transcription of the videotape would be necessary in order to utilize the present system. Accordingly, the sound track for the videotapes was transcribed and it was these transcriptions that were used for further analyses appearing in the Results section.

Table 9

Comparisons of Content Field Groups
on Instructional Intent

CURRICULUM	CLASSES	CONTENT No. Topics	CONTENT %	SKILLS No. Topics	SKILLS %
SOCIAL STUDIES	8	43	91	13	18
ELEMENTARY	8	56	90	10	11
ENGLISH	8	52	86	4	7
SCIENCE	6	12	59	26	32
TOTAL		400	91	53	17

ANALYSIS OF VARIANCE

	CONTENT				SKILLS			
SOURCE	SS	d.f.	MS	F	SS	d.f.	MS	F
Curriculum	130.77	3	43.59	2.67	89.07	3	29.69	1.93
Residual	425.10	26	16.35		399.10	26	15.35	
Total	555.87	29			488.17	29		

Table 10

Comparisons of Content Field Groups on Levels of Conceptualization

LEVELS OF CONCEPTUALIZATION

CURRICULUM	CLASSES	DATA		CONCEPT		GENERALIZATION	
		Topics	%	Topics	%	Topics	%
SOCIAL STUDIES	8	15	19	55	71	8	10
ELEMENTARY	8	38	40	56	59	1	1
ENGLISH	8	20	24	56	68	6	7
SCIENCE	6	30	25	86	72	3	3

ANALYSES OF VARIANCE

SOURCE	DATA				CONCEPT				GENERALIZATION			
	SS	d.f.	MS	F	SS	d.f.	MS	F	SS	d.f.	MS	F
Curriculum	73.56	3	24.52	3.18*	6.50	3	2.17	.34	3.56	3	1.19	.87
Residual	200.74	26	7.72		166.40	26	6.40		35.64	26	1.37	
Total	274.30	29			172.90	29						

*p < .05

The number of sessions used were those that remained after a large variety of technical problems, primarily sound, had eliminated many sessions from consideration. Other sessions were not used because the students spent the majority of the time working experiments or doing written work at their desks, etc.

At a later time, it was found to be possible for sophisticated viewers familiar with the system to view a class session twice and adequately code it without resorting to a typescript.

Results.

Instructional Intent. Table 9 shows a comparison of the curriculum areas on the dimension of Instructional Intent. Three of the four groups would seem to be relatively constant in their high percentage of content related to skill topics. The fourth group, *science*, shows a very strong emphasis on skill topics and represents a very different pattern from the other three groups. Since the total number of science classes was very small in the present study, these differences did not result in an analysis of variance reaching significance at the .05 level although it approached that level. An equal number of classes in science with the other groups would have probably resulted in such a finding, however, and raise the issue of substantial content field differences on this dimension.

In the science classes themselves, a great deal of emphasis was being placed on the interpretation of experiments and how to conduct experiments, and these discussions resulted in the very high percentage of skill topics for these classes. It is interesting to note, however, that in the English classes, where the emphasis was on evaluating stories and understanding language and communication, that the amount of skill topics was negligible. If the intent of the curriculum was to have the students understand ways in which one can obtain meaning from communications by developing particular skills of analysis, then there was a definite lack of explicit instruction to that end. The elementary classes in this group, although containing a mixture of content fields, probably was predominant in the social studies field and the results of these classes are in the general pattern of the social studies classes.

Levels of Conceptualization. Table 10 indicates the results obtained on the videotape sample on the dimension of levels of conceptualization. At the Data level there was a significant difference found between subject areas which was mainly due to the very low percentage of Data topics in the Social Studies class. The social studies groups were discussing the family, in particular, the family and societal roles. While these could be discussed at the Data level, these class sessions kept the topics at the concept level. Naturally, with talented children it is easier to avoid Data topics than it would be for slow learning students.

Table 11

Comparison of Content Field Groups on Cognitive Style

COGNITIVE STYLE

CURRICULUM	SCRIPTS	DESCRIPTION No. Topics	%	EXPLANATION No. Topics	%	EVALUATION No. Topics	%	EXPANSION No. Topics	%
SOCIAL STUDIES	8	21	26	11	14	33	41	13	16
ELEMENTARY	9	45	42	30	28	22	20	11	10
ENGLISH	9	40	45	16	18	22	25	11	12
SCIENCE	4	19	48	13	33	4	10	4	10
TOTAL	30	125	40	70	22	81	26	39	12

ANALYSIS OF VARIANCE

	DESCRIPTION				EXPLANATION				EVALUATION				EXPANSION			
SOURCE	SS	d.f.	MS	F	SS	d.f.	MS	F	SS	d.f.	MS	F	SS	d.f.	MS	F
Curriculum	27.32	3	9.11	1.00	22.49	3	7.50	1.35	28.98	3	9.66	1.05	1.32	3	.44	1.00
Residual	236.85	26	9.11		144.18	26	5.54		239.32	26	9.20		50.97	26	1.96	
Total	264.17	29			166.67	29			268.30	29			52.30	29		

As might be expected, the largest percentage of Data topics were found in the Elementary classes representing both the type of the teachers and the relative immaturity of the students in that group.

As usual, the majority of topics in all of the groups was found at the concept level. No significant difference was found between content groups on this variable. The Science classes might have had an even higher percentage at that level if a part of the class discussion had not been given over to the discussion of specific experiments that they were carrying out.

The number of topics in the Generalization category were few and far between. This finding was somewhat surprising in view of the concern in these classes for gifted children in challenging them at the highest level of conceptualization. Again the Elementary class had the least percentage of topics in this dimension, which was not surprising. The relatively few topics in all groups predetermined that no difference would be found between them.

Overall, there was no major differences between the groups except at the Data level. There remains the suggestion that the Data level is more appropriate for Social Studies classes and less so for Science classes. Differences between teachers, as indicated in the previous studies, may be more important than differences between content areas, at least in this dimension. It must be remembered that these teachers were in a common workshop that expressed some definite preferences in terms of instructional strategies that were believed appropriate and this could have contributed to the lesser variance seen in this group when compared with the others noted above.

Cognitive Style. Table 11 indicates the results obtained from the analysis of the videotape sessions on the dimension of cognitive style of instruction. These major dimensions of style for the topic classification system reveal no significant differences with regard to the analyses of variance between content groups, but there are some points that seem useful to spotlight.

The Science classes in this sample bear a striking resemblance to the six Science classes in the BSCS study with about 80 percent of the topics in either the Description or Explanation categories. Only 8 percent of the topics in the Evaluation or Expansion dimension.

The high percentage of Evaluation topics noted in the Social Studies class was due mainly to two of the eight classes placing a special emphasis on the relative goodness of the topics under discussion, and encouraging students to make a choice between alternatives.

It is encouraging that there were some Expansion topics found in each of the groups suggesting that active attempts were being made to extend the ideas of the students through divergent or unusual directions of the discussion, or through encouraging association of current discussion ideas with others the students were familiar with.

Table 12

Topic Initiators and Terminators by Subject Matter in Video Sessions

Video Sessions	Topic Initiators								Topic Terminators						Total
	Student Question		Student Statement		Teacher Question		Teacher Statement		Student Summary		Teacher Summary		No Summary		
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
SOCIAL STUDIES (N=8)	2	3	10	14	51	72	7	10	1	1	3	4	66	95	70
ENGLISH (N=9)	2	3	8	11	55	75	8	11	1	1	7	10	65	89	73
SCIENCE (N=4)	1	3	5	14	23	66	6	17	0	0	6	17	29	83	35
ELEMENTARY EDUCATION (N=9)	3	3	12	13	66	73	10	11	2	2	4	4	85	94	91
TOTAL	8	3	35	13	195	72	31	12	4	2	20	8	245	90	269

Overall, the difference that could be attributed to the content area was negligible. This does not preclude the possibility that different sequences of topics or different organization of material would still be found since these points were not analyzed in the present study.

Moreover, the common training experience of the teachers in the workshop might have had a levelling effect to the potential differences.

Video.

Initiators and Terminators. Table 12 reveals the results obtained in the video scripts on topic initiators and terminators. The results of the previous two samples reported in this study are reproduced and intensified here. Student initiation of topics is less here than in the other two samples. Only an average of 16 percent of the topics are begun by students and approximately 72 percent of the topics are begun by teacher questions. As one of the goals of the teaching sessions in the present sample was the development of inductive thinking on the part of the students, it would seem that this goal produced consistency within teachers and between subject matter.

It can be noted that there is strong similarity between the various content areas in terms of style. This would indicate that deliberate attempts to establish a particular teacher style of instruction can overcome individual differences when style is not considered a part of the instructional goal.

Out of a total of 269 topics in the present sample, only four of them were terminated by a student summary showing clearly again that the student implicitly understands the rules of this game--namely that it is the teacher who is expected to make some kind of summary statement. In fact, in this set of scripts there are relatively few summary statements made by teachers either. In the science scripts, there was an average of 17 percent teacher summary statements at the termination of a topic as opposed to only 4 percent in social studies and elementary education, perhaps reflecting the need for more closely linked ideas to proceed in science than in the other areas.

PROJECT III

VARIATION BETWEEN TEACHERS

USING SAME CURRICULUM AND CONCEPT

The purpose of the present study was to use the *topic classification system* to compare teacher instructional strategies when variables of subject matter, teacher background, student ability and concept to be taught were held constant.

Previous attempts to observe instructional content and style have often been defeated by the large number of variables that might influence classroom performance. It was the intent of this study to have the major portion of the variation due to teacher instructional strategies.

Procedure.

Subjects. The subjects in this study were six biology teachers and their high ability students who were studying the Biological Sciences Curriculum Study (BSCS) Blue Version *Molecules to Man*. All of the teachers were instructing the classes in suburban communities outside of a metropolitan area and all had had some previous training contact with the BSCS program. All teachers who were contacted agreed to participate in the study.

The students were selected for these classes on the basis of high ability and/or high achievement. The aptitude scores for five of the six class groups were obtained and transformed into standard scores. The sixth school maintained a policy of not releasing aptitude scores and thus, these were unavailable. The five groups showed the general characteristics expected of honors classes with mean aptitude scores falling between +1 and +2 standard deviations above the mean for both boys and girls.

Curriculum Content. The Biological Sciences Curriculum Study, organized in 1959 by the education committee of the American Institute of Biological Sciences, represents one of a number of reform movements in curriculum development for the schools (Schwab, 1963). By the middle 1950's, many physical scientists and mathematicians had become increasingly disturbed regarding the content of the material presented in their speciality at the secondary school level. Whatever the field of speciality, a review of existing textbooks showed that attempts to squeeze new information into traditional texts had only created a weird patchwork quilt from which the most brilliant student or the most capable teacher was hard put to extract important generalizations.

Groups of scholars in the various disciplines took it upon themselves, often in cooperation with educational personnel, to design and construct new sets of curriculum materials that would reflect more adequately the status and intent of the sciences. These ventures, supported, in large part, by financing from the National Science Foundation, have played a highly significant role in secondary education during the past decade.

This group, like others of similar nature such as the Physical Science Study Committee, the School Mathematics Study Group, the Chemical Bond Approach, etc. had as major goals:

1. The presentation of a structure of important interlocking ideas and concepts that lie at the heart of their discipline. They were willing to sacrifice breadth of coverage of an area so that the students could grasp this essential structure.

2. They were committed to the idea that one of the best ways for a student to understand science was to act like a scientist. Therefore, he should play an active role in the conducting of experiments and in performing in the scientist's role as much as was feasible.

Three major versions of the BSCS curriculum effort have been published. The 'blue' version that presents a systematic portrait of 'Molecules to Man,' is the version that was used in all classrooms in the present experiment.

While the BSCS has attempted more large-scale evaluation (See Grobman, 1962) than most of the other projects, the very nature of comparing hundreds of classes and thousands of students tends to obscure factors internal to the classroom that are potentially related to achievement.

Method.

The selection of the concept photosynthesis to be used as the focus of the recordings was made in consultation with the BSCS staff at Boulder, Colorado, who felt that this concept would give maximum latitude for the development of important ideas and generalizations. The Blue Version of BSCS was chosen in preference to the Green or Yellow versions on the basis of geographic availability of classrooms to the investigator.

Arrangements were made to record each of the classes in their discussion sections for three consecutive days while the teacher was introducing the subject of photosynthesis. In each instance, the instructor informed the investigators as to what date they would begin the discussion of this concept. The arrangements were then made to record on that date.

Three directional microphones were used and the resultant sound was placed into a mixer, thence into an Ampro tape recorder. At least one of the staff members of the project and sometimes two were present during the recording and helped arrange and balance the sound. One day of practice was used in order to establish appropriate sound levels and also to acclimate the students to the presence of the equipment before actual recordings were taken.

The observer in the classroom had a seating chart available to him identifying the students and attempted to take continuous notes, identifying the speaker wherever possible. The tape was transcribed and a final tapescript produced for analysis.

Results.

Instructional Intent. As shown in Table 13, the total number of topics for the three days of recordings ranged from 45 to 61, or about an average of from 15 to 20 topics per class session. Since there were variations in the length of class period, the key data here are presented in the form of percentages. In the first dimension of the system, Intent, there was a substantial difference between teachers in terms of their overall strategy. The percentage of Skill topics ranged from zero in YANCY and ZORBA to about 30 percent of the total in VIRGIL and WILLIE. The majority of the Skills topics found in the present study were focused at the Data and Concept level of abstraction. They ranged from the specific of 'How to work with this tube of chlorophyll' to 'How to obtain a pH value with the indicator dyes' to the more general topics focusing on 'The value of using chromotography in collecting data' and 'The use of constants in scientific formulas.'

The purpose of these Skills topics seemed to be on the development of greater student aptitude to act in the role of a scientist and appeared to be directly related to one of the major goals of the BSCS program, *teaching science as inquiry. Despite this common goal, there* was significant variation between the six classes in terms of the frequency with which these matters were focused on in class discussion.

This does not mean that those teachers not showing any Skills topics in this analysis did not pay attention to this goal. It is quite feasible that in laboratory sessions or in discussions with individual students these topics did receive attention.

Level of Conceptualization. Table 13 shows substantial differences in the percentage of topics used in the current class sessions. At the highest level, Generalization, demanding a focus on a large idea with broad application or a discussion of an abstract system, the range of percentage of total topics was from 2 to 16 percent. In those classes receiving the higher percentages there were discussions on the interrelated parts of the photosynthesis process, discussions of glucose conversion to starch, and several generalizations on the nature of light.

An interesting pattern was revealed in YANCY where 95 percent of all topics were found to be at the Concept level with consequently little Data or Generalization. There is some reason to believe that the Generalization level is hard to reach without a substantial amount of concrete data present either in the students' current perceptions or in his memory bank. VIRGIL and WILLIE both show an affinity for discussions focusing on specifics (27% and 32% Data topics) which corresponds to the presence of Skills topics in their classes. A Chi Square test on the proportions involved under Levels of Abstraction indicated a highly significant difference between teachers on this dimension.

Table 13

Percent of Topics in BSCS Sample on Goals, Level of Conceptualization and Style

Class	Total Topics	Intent		Level of Conceptualization			Cognitive Style				
		Content	Skills	Data	Concept	Generalization	Description	Explanation	Evaluation-J.	Evaluation-M.	Expansion
URIAH	55	96	4	7	91	2	31	40	7	0	22
VIRGIL	45	71	29	27	68	6	33	48	9	0	9
WILLIE	61	70	30	32	64	4	48	38	4	0	11
XAVIER	48	85	15	26	58	16	44	37	2	0	17
YANCY	60	100	0	3	95	2	39	46	7	0	8
ZORBA	57	100	0	11	80	9	38	47	2	2	11

Intent	Level of Conceptualization	Cognitive Style
$X^2 = 48.84$	$X^2 = 34.77$	$X^2 = 14.98$
df = 5	df = 10	df = 15
$p = < .01$	$p = < .01$	$p = < .50$

Table 14

Topic Initiators and Terminators in BSCS Scripts

BSCS Class	Topic Initiators								Topic Terminators						Total
	Student Question		Student Statement		Teacher Question		Teacher Statement		Student Summary		Teacher Summary		No Summary		
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
URIAH	7	14	2	4	28	56	13	26	2	4	7	14	41	82	50
VIRGIL	5	14	4	11	24	65	4	11	1	3	10	27	26	70	37
WILLIE	0	0	2	4	30	58	20	38	1	2	8	15	43	83	52
XAVIER	4	10	0	0	5	12	31	77	0	0	3	8	37	92	40
YANCY	7	15	0	0	26	54	15	31	1	2	10	21	37	77	48
ZORBA	1	2	0	0	19	48	20	50	0	0	5	12	35	88	40
TOTAL	24	9	8	3	132	49	103	39	5	2	43	16	219	82	

Cognitive Style. In the third general dimension of the classification system, *Style*, there was a fairly common pattern revealed across all six teachers, with a great emphasis on topics in the areas of *Description* and *Explanation*. From 71 to 85 percent of the topics fell in these classifications in the present sample. There were few topics which dealt with *Evaluation* or decision making of any sort. The greatest variation in Style categories was found in the Expansion dimension, with URIAH showing 20 percent of the topics in this dimension, while YANCY revealed a low of 3 percent.

One can note also that the Evaluation-Matching category was hardly used at all. This means that judgments made on the basis of a matching of instances or data to an established criterion or criteria was rarely seen in these classes. The high percentage of Expansion topics in URIAH was due to some degree to the teacher's extensive use of graphs in class discussions. The translation of data from one medium to another, from figural to verbal, was one major criteria for the Expansion category. A comparison and contrasting of two or more ideas also increased the Expansion topic count in that instance. A Chi Square test of the differences between teachers failed to reveal significant differences in Style and suggested that the patterns shown by these six teachers were consistent with one another with the emphasis resting strongly on the dimensions of *Description* and *Explanation*.

Overall, there were significant differences between teachers found in two of the three major dimensions of the Topic Classification System. In Goals and Levels, there were sufficient teacher variations to suggest that the individual teacher was having a substantial impact on how the biological concepts will be presented in class discussions in these dimensions. Only in the Style dimension did the teachers seem to show some degree or uniformity of pattern. A further analysis revealed that there were similar teacher diversity in actual ideas discussed, in sequence of ideas covered, and additional ideas included. (See Gallagher, 1967.)

Initiators and Terminators. Table 15 shows the results obtained on topic initiators and terminators for the BSCS scripts. In the use of initiators, a very similar pattern may be noted to that obtained in the productive thinking sample. There was very little student participation in beginning topics. Overall, a total of 12 percent of the topics were begun by either student question or student statement. The predominant method for beginning a topic was a teacher question, although there were marked individual differences between teachers on this personal style.

Remembering that all teachers were covering the same subject matter in this group, it is interesting to note that the teacher in VIRGIL started 63 percent of his topics with questions and only 11 percent of the topics with a teacher statement. He also had the highest number of student participation in initiating topics, 25 percent of the total topics. In contrast, the teacher in XAVIER started 77 percent of the topics himself with a teacher statement, a rather straightforward lecture approach.

In the case of topic terminations, the predominant method was to have no summary but to merely move into the next topic. Whenever there was a summary the chances were about 2 to 1 that it would be done by the teacher. Only a total of five topics were terminated by student summaries out of a total of 107 which gives great strength to the proposition that students do not perceive their role in the classroom discussion as producing summary statements. This viewpoint is consistent with the teacher's approach to the perceived classroom role behavior. There was again a substantial amount of individual teacher differences while using the same subject matter. From a low of 0 percent of the topics providing summary to a high of 37 percent, it is clear that teacher style in providing an integrating comment before moving on to other matters varies widely even when content and subject matter is controlled for.

The results of this study have confirmed again that diversity is the central fact of human existence. In this case, the diversity of six competent teachers in their method of presenting the same curriculum materials. Such diversity may or may not have substantial influence on students, but it would be surprising indeed if it did not. It would seem to suggest that those interested in curriculum development have not finished their job when they have packaged a cognitively valid and consistent set of materials. They must establish, in addition, how these materials are operationally introduced in the classroom environment. Otherwise, they will be left with certain unjustified assumptions as to how their package is unwrapped in the classroom.

CONCLUSIONS

The results of the three studies reported in this program of research on classroom interaction indicates that certain findings did reach the level of some generalization regarding the performance of teacher and students in classrooms of talented students at the junior and senior high school levels. One of the strong and overriding impressions from the data was the complete teacher dominance or control over class discussions. These results closely parallel the findings of Bellack. In each of the three studies in the current research program, regardless of the content field, the teachers controlled the introduction of the topics, the completion of topics, and whatever summaries or conclusions presented.

The topic classification system, devised as a tool for the studying of classroom interaction, proved to be useful in distinguishing variations between teachers, between content areas and between students. In this respect, the three dimensional nature of the system provided a basis for looking at attitude and classroom climate dimensions and as a basis for analyzing the cognitive content. While the affective dimension of classroom interaction is a reflection of the basic relationship between teacher and student, it is the cognitive dimension that provides the foreground of the instructional environment. This Topic Classification System provides a way in which the teacher can operate in the foreground and, through various feedback dimensions such as videotape replay or observer analysis, can have a reasonably clear picture of the ways in which topics develop and what modifications one might make to reach their instructional objectives with their own class groups.

Topic Style. From the four major areas of style--Description, Explanation, Expansion and Evaluation--it is clear that the major emphasis in practically all classes, regardless of content field, was on Description and Explanation. They provide the staple of class discussion. It would be hard to think of any extensive classroom discussion without either a clear statement of the facts or an explanation of how the facts fit together. On the other hand, the investigator was disappointed at the relatively rare use, sometimes complete absence, of topics in the dimensions of Expansion and Evaluation. In the case of Expansion, it seems likely that teachers have not been effectively instructed on how to broaden the scope of discussion and have depended on their own devices for doing so. The ability to stimulate divergent thinking, while it may come natural for the few teachers, is something that needs to be cultivated, if this seems to be a desirable instructional objective.

Perhaps the area of cognitive style which gave the most difficulty to teachers is the dimension of Evaluation. It appeared that the teacher did not know how to begin such topics and, having begun them, did not know how to end them. This point will be discussed at greater length later in this discussion section.

In the dimension of instructional intent, significant teacher variation was noted in the tendency to use skills versus content topics. This variation was related again to instructional objectives. If the focus of the discussion was to help students develop certain skills by which they may attack subject matter more meaningfully, or to organize it more systematically, then explicit instruction on the part of the teacher will be necessary. The fact that many teachers in these segments had none or almost no skills topics suggested either that this was not a legitimate instructional objective from their standpoint or they did not know how to perform it. A final possibility was that the skills dimension was taught in other than the discussion sections, as for instance, in laboratory sections.

Of particular interest was the lack of generalization topics in the discussion sections even with these groups of talented and gifted students. One must think that either discussion sections themselves are not amenable to the presentation of complex ideas or systems or that these teachers are unable to bring them forth.

Subject matter differences. Although the distinction between content areas is limited by the small sample of teachers involved, there appears to be evidence to believe that the content areas do differ rather importantly along the dimensions of the Topic Classification System. These differences are not totally determining and the teacher with certain instructional objectives can override the general content trend. However, the trends themselves are of some importance.

While all the classrooms seem to lean heavily in the use of Description and Explanation topics, science classes seem to do so even more strongly than the others. There seems to be a natural tendency for science classes to stick rather closely to the analysis and explanation of events and to avoid topics smacking of evaluation or choice of ideas or concepts. They do not often use Expansion topics which extend the idea beyond the particular context in which it is now being discussed.

Science class discussions most frequently are found at the Concept level. The only exception to this is when specific experiments are being discussed, or specific activities of the student, when the discussion falls at the Data level.

In contrast, English does seem to have a tendency to place more emphasis on topics concerned with evaluation. These evaluation topics most often take the form of a discussion of goodness or correctness between alternatives or sometimes matched against some absolute value such as the importance of a poem, or the appropriateness of a particular style of writing for a particular situation. Even in English sections, however, it was rare to find explicit criteria developed by the students or by the teacher by which the students could make the evaluations. In most instances, the criteria by which the evaluation was made was implicitly available only in the mind of the evaluator and very seldom shared with the teacher or other students.

The area of social studies had some particular potential for topic variation. In some social studies classes, considerable data was present. This would be particularly true in a subject such as history where one can become involved in the description of actual events or their explanation so that the major emphasis is on the behavior of particular individuals, which would be classified at the data level. However, teachers who wish to focus on larger ideas, such as family systems, could move very effectively into the Generalization level. Again, it depends upon the teacher's objectives, and particular skill in achieving those objectives, as to what the level and style of topic being discussed actually turns out to be.

Limitations of discussion as instructional technique.

As the analysis progressed in the various studies, it seemed clear that there were a number of limitations upon the use of classroom discussion. In this series of studies, no attempt was made to influence or compel the teacher to follow any particular strategy or approach. The teacher was allowed to design the classroom situation pretty much as he pleased with the only restriction being that we did not wish to record unless major verbal interaction was expected. In most of these sessions, there was no trouble in setting up such arrangements since this was the usual instructional strategy used by the teacher anyhow.

Limitation on Student Initiation. One of the substantial limitations that follow from an extension or exclusive use of classroom discussion would be the conceptual boundaries that it places on the student and his own ideas. By common agreement, individual initiative, or striking in a completely different direction, is not well thought of in these sessions. The other students can become disciplinarians since whenever a student goes off on too much of a divergent tack, he is criticized.

The vast majority of ideas are introduced by the teacher and in most cases for specific instructional objectives. Certainly one of those things which are not objectives of these discussions is the development of student autonomy in the intellectual domain.

Some consideration should be given to the distinction between private and public conversation, particularly as it relates to sex differences in the first study. It would seem as though public discussion, in the sense that all persons in the classroom listen to and may respond to the discussion, may very well have an inhibiting effect on the more withdrawn or uncertain student. Unwilling to present ideas that may be attacked or held up to ridicule either by teacher or the students, this student may prefer to remain silent and not enter the intellectual arena. If, on the other hand, one of the teaching strategies used is a private communication in which the teacher and the student hold a dialogue not available, or not readily available, to the other students, the possibility for individual exploration of ideas in those students would be enhanced.

Generalizations and Systems. General class discussions may very well be a poor technique for development and presentation of larger ideas and systems or of associations of ideas. It would seem that the ideal way in which to present a larger idea is to provide a clear and concise sequence of the lesser ideas leading to the construction of the larger generalization. For the student himself to be able to grasp this generalization, these important supporting ideas need to be presented as free from extraneous materials as possible.

Yet, the nature of class discussion, even under tight teacher control, is to wander off into many diversions. Remembering the important social interaction factors and variables going into such teenage discussions, it is very difficult to conceive of how students can master the larger ideas. It would seem, therefore, important to put into the total recipe for curriculum construction the opportunity for the student to, in private or in some degree of isolation, be allowed the luxury of searching for the large idea or system that is the objective of the instruction. Such a system could be an effectively designed programmed learning sequence which systematically takes the student to its objectives without the many social and cognitive diversions of classroom interaction.

A third major area of limitations lies in the Skills dimension of instructional intent. If one's purpose is to establish skills as part of the student's total development, then these should be explicitly presented to the student with plenty of opportunity for the student to practice the skills. The science program is perhaps more effective than other content fields in following this technique with the laboratory being the expected dimension in which *skills* are learned. However, such laboratory skills are often at the Data and Concept level whereas some of the important ideas related to skills such as the nature of the scientific method itself are not adaptable to laboratory setting. It would follow, then, that teachers need *explicit* instruction in how to develop Skills, as opposed to Content, in the total classroom situation.

It might also be necessary or desirable for certain classes, such as social studies, to have laboratory sessions where skills were developed as a major instructional goal.

There was the general impression that the area of evaluation was actively avoided. The teachers did not know how to begin an evaluation topic in which the emphasis was on how good or proper or appropriate something was, and they certainly did not know how to end or close off a discussion where there was no general truth agreed upon. Evaluation topics often end with a lack of consensus among the discussants regarding the 'appropriate' response. There was no indication that any of the teachers had a clear concept of how to establish criteria by which evaluative judgments can be made.

In a valueless society in which no one from teacher to politician to professional person to unskilled worker has had much practice in dealing with values either in school or out of school as a major topic for consideration or discussion. Such value issues evoke great disturbance and apparently the easiest way out of such disturbance is to avoid it when you can. It is possible to have as a part of the classroom recipe only the ingredients of description and explanation. They will not make an interesting discussion but, on the other hand, they will not give the teacher any great difficulty either. That apparently would seem to be the kind of situation that the unprepared teacher, unprepared in the sense of being trained to evoke certain cognitive styles, has faced, if this study is any indication.

In terms of broad applications of the results of the present program of research there are two major directions that can be taken. One can be in the search for a theory of instruction that can provide the basis for a genuine science of education and another in providing a vehicle for the practitioner to more adequately improve his own performance.

Bruner (1966) has stated some of the conditions for the development of a theory of instruction, as follows.

1. A theory of instruction should specify the experiences which most effectively implant in the individual a predisposition toward learning--learning in general or a particular type of learning.

2. A theory of instruction must specify the ways in which a body of knowledge should be structured so that it can be most readily grasped by the learner.

3. A theory of instruction should specify the most effective sequences in which to present the materials to be learned.

4. A theory of instruction should specify the nature and pacing of rewards and punishments in the process of learning and teaching.

A fifth point might have been added. In order to evolve a theory of instruction and to test it adequately certain tools need to be developed. The Topic Classification System, devised as part of the program of research reported on in this study, is such a tool.

Science tends to ride on the wings of its measuring instruments and a theory of instruction that is comprehensive must first pay adequate attention to the development of measuring tools that have conceptual validity which, when used, enriches the dimensions of the theory itself.

The Topic Classification System has also demonstrated some usefulness in aiding teachers to plan their lessons and, more important, to be able to use feedback information on their own performance. The value of observing one's own behavior, whether it be in playing golf or teaching, is well accepted. But, in order for such observation to be maximally useful, the teacher must not only know when he is doing something incorrectly but also must have some conceptual scheme on how to approach more nearly to his objectives.

Some type of system of analyzing teacher objectives and student performance such as illustrated in the present study would seem to be the sine qua non for adequate teacher training and teacher self improvement. Continued research in the varied dimensions of classroom interaction would seem to be the most useful vehicle for stimulating a more sophisticated theory of instruction and more useful devices for teacher training.

REFERENCES

Anderson, H.H. The measurement of domination and of socially integrative behavior in teachers' contacts with children. Child Development. 1939, 10, 73-89.

Aschner, Mary Jane; Gallagher, J.J.; Perry, Joyce; Afsar, Sybil; Jenne, W.C.; and Farr, Helen. A system for classifying thought processes in the context of classroom verbal interaction. Urbana, Illinois. Institute for Research on Exceptional Children, University of Illinois, 1965.

Bellack, A.A. and Davitz, J.R. The language of the classroom: meanings communicated in high school teaching. Teachers College, New York, New York. U.S. Office of Education. Cooperative Research Project #1497, 1963.

Bloom, B.S. (Ed.) Taxonomy of educational objectives. Handbook I: cognitive domain. New York: Longmans Green, 1956.

Bruner, J.S. Toward a theory of instruction. Cambridge, Massachusetts: Belknap Press, 1966.

Flanders, N.A. Teacher influence, pupil attitudes and achievement. Minneapolis, Minnesota: University of Minnesota Press, 1965.

Gallagher, J.J. Productive thinking of gifted children. Urbana, Illinois: University of Illinois, U.S. Office of Education. Cooperative Research Project #965, 1965.

Gallagher, J.J.; Aschner, Mary Jane; and Jenne, W. Productive thinking of gifted children in classroom interaction. CEC Research Monographs. Series B-5, 1967.

Gallagher, J.J.; Shaffer, Faye; Phillips, Sondra; Addy, Sandra; Rainer, Mary Ann; and Nelson, T. A system of topic classification. Urbana, Illinois: Institute for Research on Exceptional Children, University of Illinois, 1966.

Getzels, J.W. and Jackson, P.W. The teacher personality and characteristics in Gage, N.L. (Ed.) Handbook of Research on Teaching. Chicago, Illinois: American Educational Research Association, Rand McNally, 1963.

Guilford, J.P. The structure of intellect. Psychological Bulletin. 1956, 53, 267-293.

Guilford, J.P. The three faces of intellect. American Psychologist. 1959, 14, 469-479.

Guilford, J.P. *The nature of human intelligence*. New York: McGraw-Hill, 1967.

Hughes, Marie. *Development of the means of the assessment of the quality of teaching in elementary schools*. Salt Lake City: University of Utah Press, 195[illegible].

Medley, D.M. and Mitzel, H.E. Measuring classroom behavior by systematic observation in Gage N.L. (ED.) *Handbook of Research on Teaching*. Chicago, Illinois: American Educational Research Association, Rand McNally, 1963.

Smith, B.O. and Meux, M.O. *A study of the logic of teaching*. Urbana, Illinois: University of Illinois, U.S. Office of Education. Cooperative Research Project #258, 1962.

Smith, B.O., et.al. *A tentative report on the strategies of teaching*. Urbana, Illinois: Bureau of Educational Research, University of Illinois, 1963.

Smith, B.O.; Meux, M.; Coombs, J.; Nuthall, G.; and Precians, R. *A study of the strategies of teaching*. Urbana, Illinois: Bureau of Educational Research, University of Illinois, 1967.

Spaulding, R.L. *A coping analysis schedule for educational settings*. Durham, North Carolina: Education Improvement Program, Duke University, 1966.

Suchman, J.R. *The elementary school training program in scientific inquiry*. Urbana, Illinois: University of Illinois Press, 1962.

Taba, Hilda; Levine, S.; and Elzey, F.F. *Thinking in elementary school children*. San Francisco, California: San Francisco State College, U.S. Office of Education. Cooperative Research Project #1574, 1964.

Taba, Hilda. *Teaching strategies and cognitive functioning in elementary school children*. San Francisco, California: San Francisco State College, U.S. Office of Education. Cooperative Research Project #2404, 1966.

Withall, J. Development of a technique for the measurement of socio-emotional climate in classrooms. *Journal of Experimental Education*. 1949, 17, 347-361.

APPENDIX A

A SYSTEM OF TOPIC CLASSIFICATION

CLASSROOM INTERACTION STUDY

James Gallagher
Faye Shaffer
Sondra Phillips
Sandra Addy
Mary Ann Rainer
Thomas Nelson

Institute for Research on Exceptional Children
University of Illinois

The very nature of creating some form of model does reflect, however, certain evaluative judgments of the creators. In this case, the three dimensional model seen below represents certain judgments regarding important dimensions to be observed and others to be dismissed in relation to the classroom.

Possibly the most controversial decision was to limit our attention to the cognitive realm and not to try to delineate the affective realm. The creators of this system realize fully that the hopes, fears, and motives of the participants in any classroom influence the performance of the individual and the group. At the same time, the focus of classroom interaction is almost entirely related to the cognitive realm and it is in that sphere of activity that we have centered our own energies.

The Model and Its Dimensions

Content -- Skills. One of the dimensions perceived as important was that of CONTENT-SKILLS. This dichotomy refers to two manifest and distinctively different teaching goals. The first, CONTENT, refers to the goal of having the student learn a given body of knowledge. Information, ideas or concepts are presented directly to the student and he is expected to absorb them.

The second area, SKILLS, refers to the goal of teaching the student a set of behaviors or skills which will enable him to successfully master situations he will meet in the future. While these are commonly thought of in terms of teaching physical or motor skills in shop or on the athletic field, it also refers to such things as reading skills, learning grammatical rules, certain mathematical operations, how to collect data, how to think and reason, etc. Such a distinction appeared to have definite relevance for differentiating teacher performance and style in various subject areas.

Concept Level. One of the weaknesses of previously constructed systems has been their reliance on content of affective dimensions without considering the level of conceptualization. Thus, teacher praise can be given for trivial or incorrect answers. Or a presumed teacher strategy for creative thinking can be presented on such a concrete and limited level that the presumed excellence of such teacher behavior can be seriously questioned. A full understanding of teacher style and its influence must, we feel, include the level of thought abstraction.

The three levels utilized here are crude and a deliberately limited view of the infinitely complex abstractional ladder. Nevertheless, we feel that they represent clearly recognizable and important teaching differentiations. DATA represents the discussion of specifics, the individual event or instance, the personal anecdote, the concrete level of happenings. CONCEPT represents the abstraction of data to general ideas and their applications or associations while GENERALIZATION represents the larger ideas or concepts in relationship to one another as in scientific laws or general principles of economics or history.

Style. This dimension deals with the mode of handling the discussion in the classroom. The focus is on a type of information processing in the larger sense of that term. The focus can be on DESCRIPTION, of the defining and describing aspects of a concept or happening; on EXPANSION which leads the group off in other lines of thinking or new associations; on EXPLANATION, or the attempts to present reasoned argument through sequential steps; on EVALUATION-JUSTIFICATION, or the attempts to judge and then explain the reasons for the judgment; or EVALUATION-MATCHING which applies criteria and judgment to the items under discussion.

It is possibly in this area that the teacher expresses his own individuality. It has been suggested that the emphasis on various styles also influences the student's own style of information processing.

The procedure for topic division given below should ideally be carried out by two persons who would then reach consensus on their results. The following points pertain to a script of about 50 to 60 minutes duration. They can be extrapolated to apply to shorter or longer scripts.

1. The first step is to read through the script, drawing a line whenever there is a shift in focus of subject under discussion and, thus, a change in topic. Each of the topics set off in this manner must be given a brief name, summarizing its content.

   EXAMPLE:

   Topic F Sue: ...and so Rikki-Tikki-Tavi saved the day.

   Topic G Teacher: Now that you've told us about what you've read from the collection of short stories, would someone like to tell us just what a short story is? How does it differ from a novel?

   Topic F might be named: summary of "Rikki-Tikki-Tavi."

   Topic G might be named: comparison of novel and short story.

   An example of a form which may be used to record these divisions and topic names, as well as the later classification, follows.

2. When dividing a script into topics if the divider decides on a name for a topic while reading one page, he must be sure that the same name applies equally well to the topic on the following page or pages. It is most important to note what is actually under discussion and not be misled by what the teacher tries to elicit from the class, as the two may not be the same.

EXAMPLE:

Teacher: What are some of the problems that might face colonists from earth who wished to set up research laboratories on Mars?

Judy: Well, I think there are many other problems that have to be settled first. How are they going to get there? What will....

3. Topics are designated by the letters A, B, C, D, E, etc. in a given class session. Undeveloped topics are indicated by a lower case letter a, b, c, d, e, etc. It is possible for a topic to be interrupted and be returned to later in the class discussion. One test as to whether a return to a previous topic is being made is that it must be possible to give it an identical name and, later, an identical classification to the previous topic. A return to a topic is labeled with the same letter designation as the original A, B, C, etc.

Figure 2. Sample Listing of Topic Classification

Script: ______________________ Judge: ________________

______________________ Date: ________________

Page	Topic Letter	Topic Name	Classification
1-3	A	Structuring	
3-4	B	students list life goals	
4	c	how to qualify for jobs	(undeveloped)
4-6	D	difference of goals of Ann & Jim	
6-7	E	Activity	
7-8	B	students list life goals	(a return)

4. The minimum length for a developed topic is 15 typewritten lines or script. Any shorter topic is undeveloped. An undeveloped topic must be labeled as SKILLS or CONTENT and may be classified as DATA, CONCEPT, or GENERALIZATION.

5. If the person making divisions finds a topic which extends beyond three pages of script he should become suspicious that he is not dividing properly. There will be very few topics that extend beyond three pages -- the average length is one to two pages.

6. There will generally be from 15 to 25 topics per script of 50 to 60 minutes in length.

7. If there is an undeveloped topic (less than 15 lines) which is preceded and followed by a topic which remains the same, that is to say, embedded within a developed topic (Example: Topic A -- Undeveloped Topic b -- back to Topic A) the situation will be handled in one of these ways: (See pg. 18 for discussion of CONTENT vs. SKILLS)

   a. The undeveloped topic will be ignored if it is a CONTENT topic embedded within a developed SKILLS topic.

   b. The undeveloped topic will be ignored if it is a SKILLS topic embedded within a developed SKILLS topic.

c. The undeveloped topic will be ignored if it is a CONTENT topic embedded within a developed CONTENT topic.

d. The undeveloped topic will be divided off if it is a SKILLS topic embedded within a developed CONTENT topic.

8. When an undeveloped topic is preceded by a developed topic and followed by a different developed topic (example: Topic A -- Undeveloped Topic b - Topic C) it is divided off from the other two. If, however, the divider can see a relationship between the undeveloped topic and one of the developed topics on either side of it he should merge it into the large topic.

9. When the divider is faced with a situation in which he is uncertain whether to have one rather long topic or two shorter topics, he should tend to divide the controversial section into the shorter topics.

10. Activity (defined on page 38) will be divided off when it consumes at least two minutes of class time and will be designated by a letter (A, B, C, etc.). It will be classified as CONTENT or SKILLS when possible, as well as being given the style classification of 6.

11. Management (defined on page 36) will be bracketed and included in the topic where it occurs.

EXAMPLE:

Teacher: O.K., now just as it takes skill to convey your message with pictures, it takes skill to convey a message with words. (Jean, would you close the window? I think we are all about to freeze.) Now later today some of you are going to talk about some of these pictures. What are some rules...

12. Structuring (defined on page 37) will be ignored unless it is at least 15 lines long. When it exceeds this minimum length, Structuring will be divided off as a topic is and given a letter designation. It will be classified as 007 but it will not be given a name.

13. Summaries (defined on page 17) will be treated as regular topics when they consist of at least 15 or more lines of typewritten script. If a summary is less than fifteen lines in length but more than five it will be underlined and left as a part of the topic in which it occurs. If it is less than five lines in length it will be ignored.

14. The following cues may be helpful in establishing the dividing points of topics.

    a. Sometimes, a word cue from the teacher indicates a shift in the discussion focus and hence in the topic, such as "O.K.", "Now", "Alright now", etc.

EXAMPLE:

Topic A Teacher:	...and when I bring this piece of fur close to the electroscope, the leaves spread./
Topic B	Now, what causes the electroscope to work that way?

b. There may be a brief summary by the teacher at the end of a topic.

EXAMPLE:

Topic H Teacher:	Mercantilism, then, is an economic philosophy based on these principles: get possession of as many precious metals as you can, encourage industries which change raw materials into manufactured products that can be exported, and encourage a large population which will provide workers. All of this would lead to a favorable balance of trade./
Topic I	Steve, you've been reading about the economics of more primitive areas of civilization. How does trade operate under these conditions?

c. Topics often begin with a question by the teacher.

EXAMPLE:

Teacher:	How would you define a parasite, Gerald?

or,

Teacher:	Would you say that all streps are harmful? Why not Charles? You're shaking your head.

d. Topics are very often initiated and terminated by the teacher.

III. Topic Focus

During the process of topic division and topic naming the focus of the topic must be determined. The focus is the central idea which pervades a topic. It is often expressed by a few words which label the topic. Each time there is a shift in focus a new topic begins.

This central idea or focus must be derived from what is actually stated within the topic, not from inferences about what has been said. When the content of the entire topic has been considered, as well as the context in which it is found, the topic must be given a name. The topic name is a brief summary of what has been discussed, a summary which gives the central idea or focus. This topic naming is a crucial exercise, for success in the later operation of topic classification is dependent on its having been done accurately and descriptively.

EXAMPLE:

(Topic A)

Teacher: Alright, an aerobe is what kind of bacteria?
Can you answer that for us, Sue?

Sue: I can't explain what an aerobe is but an anaerobe
is a bacteria that can live in places where the
air has been closed off.

Teacher: Right. They do not need free oxygen from the
air but they use the combined oxygen that they
find in what? Roger?

Roger: Inside the host.

Teacher: Yes, inside the host or the food on which they are growing. It might be the oxygen from a sugar or the oxygen from a fat or something like that but it's combined chemically. That is the distinctive feature of an anaerobe./ Now,

Topic 3 what about an aerobe? Let's get back to that. Sue, ...

A name which clearly and concisely indicates the focus of the above topic example might be "giving the main characteristics of an anaerobe."

On the other hand, the above topic example might have been inaccurately named, "description of an aerobe" if based solely on the teacher's first attempt to set the focus. It must be remembered that the entire content of the topic must be weighed in determining focus and in the resultant naming.

When naming the topic example above it may have seemed that what they were really trying to say could best be summarized as "bacteria may potentially be found almost everywhere." This topic name is also inaccurate for the namer must never make inferences. Only that which is actually stated in the script must be considered.

IV. Theme Definition

A theme is a unifying element for a group of related topics. It represents a larger idea which encompasses series of topics. When the script has been divided into topics and they have been named, themes are determined by looking for clusters of related topics. There are generally one to four themes per script of 50 to 60 minutes duration. There will be no undeveloped themes. Rather, there will be occasional topics in a script that do not fit under any theme. If a statement is made within the script which sets forth a theme this may be underlined. The final determination of the themes commenced in the same fashion as the topics. There may be some topics that do not fit under any of these themes. A topic unrelated to any theme, such as topics E and I in the example below, may occur at any point in a series of otherwise related topics. The determination of themes serves as an aid in perceiving a broader picture of the discussion patterns to be found in a particular class session. A theme must encompass at least three related topics.

EXAMPLE:

Theme--Great Men in the History of Bacteriology

Topic A--Van Leeuwenhock and the Microscope
Topic B--Jenner and Smallpox Vaccination
Topic C--Pasteur and Rabies Treatment
Topic D--Lister and Aseptic Surgery

Topic E--Listerine Antiseptic

Theme--Types of Bacteria and Diseases They Cause

Topic F--*Clostridium tentani* and Tetanus
Topic G--*Clostridium botulism* and Food Poisoning
Topic H--Antrax Caused by Spore Formers

Topic I--Careers in Bacteriology
(Does not fit under any theme.)

V. Summaries

When there is a Summary of the topic or theme under discussion such a Summary is underlined. If the topic is more than 15 lines long it is scored as a separate topic. If the passage is less than 15 lines long, it is underlined and included as part of the closest associated topic.

Exception: Occasionally a teacher will present a summary of the past work of the class at the very beginning of a class session. If 15 lines long, it is treated as just another topic, if less than 15 lines it is underlined and treated as an undeveloped topic.

VI. Topic Returns

When there is a return to a topic that has been previously introduced, it is labeled the same topic letter as the original introduction. Sometimes two undeveloped topics would combine to have the necessary length for a developed topic. In this case they are handled as noted below.

TOPIC	LABEL	CLASSIFICATION
E ← - - - e	The Seneca's Revenge	1 - 1 - 1
F	Trade Policies in the Colonies	1 - 2 - 5
e	Return--The Seneca's Revenge	1 - 1 - 1

CLASSIFYING TOPICS

I. CONTENT-SKILLS Dimension

This dimension has been considered important because of two very different approaches to instruction -- one concentrating on knowledge and the other concentrating on giving students skills by which to seek or process knowledge.

A topic fits into the SKILLS category when the explicit intent of the lesson is to increase the student's skill in methodology of the subject matter and related areas or to create a set towards handling the data from a subject area; i.e., teaching the scientific method. Since most classroom activity has teaching this skill as one type of goal, the decision has to be made on the basis of the dominant aspect of the classroom interchange. All topics that would not fit into SKILLS are automatically CONTENT.

A. Identification of SKILLS

One of the following criteria should be present for a topic to be labeled SKILLS.

1. The student is being prepared to be a "doer".

SKILLS:	The description of a telescope and how it is used in an astronomy class before students make their own observations. (SKILLS-CONCEPT-DESCRIPTION)
CONTENT:	The description of Galileo's telescope in a class discussing his discoveries. (While one might make a case for long-range goals of skills, the dominant emphasis would be on content.) (CONTENT-DATA-DESCRIPTION)

IN THE CASE OF RULES 2 AND 3 BELOW, THE STUDENTS MUST BE EXPLICITLY INFORMED DURING THAT DAY'S CLASS SESSION THAT THEY WOULD BE EXPECTED TO PERFORM THESE SKILLS BEFORE THE TOPIC WOULD BE SO CATEGORIZED.

2. Teacher is demonstrating with clear intent that the students will be better doers from such observation.

SKILLS: The teacher shows class how to use spectroscope prior to the student use of tool in collecting own data.

The teacher shows how to outline an essay prior to student assignment of same task.

CONTENT: The teacher demonstrates concept of light waves and spectrum through use of spectroscope.

The teacher demonstrates outlining an essay with dominant theme of discussion on whether the essay has a summary and conclusions.

3. The focus of discussion is on how a student should study a given area rather than on the concepts related to that subject area.

SKILLS	CONTENT
A discussion on how one checks historical data for validity with emphasis on the student eventually doing it.	The class discusses whether Patric Henry really uttered his fateful words.
The class discusses how a scientist is expected to search in an area where few facts are now available.	The class discusses Freud and his methodology in trying to unravel mental illness.

SKILLS	CONTENT
A discussion centers on the various means of presenting data obtained from an experiment.	A curve relating temperature and pressure is examined to see what inferences can be drawn from the data.
Discussion of class is on how to read for critical evaluation.	Class is told to read critically the editorials in last night's paper.

II. Levels of Abstraction

One of the key determiners of utility and quality of classroom instruction is the level of abstraction at which the discussion is held. The most important idea can be met in a trivial fashion or the most innocuous set of data or experiences can be used to elevate the children's thinking. Three levels of abstraction have been chosen for use in this classification system as instructionally important. The division points, while arbitrary, have a certain rationale for study and training purposes.

A. DATA Level

These are topics where the focus of discussion is on specifics where a particular event, object, action or condition is considered. The emphasis is on things and people rather than abstract ideas. The student should be able to touch, see, hear, etc., the entities that are the focus of this type of topic.

EXAMPLES:

A description of one of Winston Churchill's brushes with Laborites in the House of Commons.

A story of how I trapped a skunk.

A teacher demonstrates how to interpret the colors on the classroom globe.

An argument over whether George Washington had false teeth or not.

A student explains how he developed the material for his report on Angola.

A descriptive report on the class play.

A discussion of the use of a tool or method in specific regard to a particular instance (as in an experiment or exercise in class).

DATA--Special Issues. Sometimes the specific instance is used only as an illustration with the focus on the topic being on a concept or generalization. If this is the case, then the topic is classified at the higher level, as in the examples below. However, the higher level CONCEPT or GENERALIZATION must be stated explicitly in the topic or it remains at the DATA level.

EXAMPLES:

Remember we have said the great men are often unappreciated in their own time--take Winston Churchill's treatment in the House of Commons.

A story of how I trapped a skunk which illustrates the larger concept of how humans outsmart animals.

B. CONCEPT Level

This type of topic focuses on ideas and classes of objects, events, processes, etc. It often deals with class inclusion or exclusion. Topic focus is thus on an abstraction, even though specifics may be used in the topic for illustration.

EXAMPLES:

Discussions which deal with the definition of virus, sales tax, social group, mammal, etc.

Explanations of the operation of a social group.

Discussions as to whether sales taxes are equitable.

Who belongs in the mammalian category.

How gasoline ignites.

CONCEPT--Special Issues. Many topics will discuss concepts that are known to be parts of larger systems. The stomach is part of the digestive system, the piston plays a part in the gasoline cycle, a legislative hearing is part of the process in obtaining a law. Nevertheless, if these systems' interrelationships are not made explicit or the larger ideas specifically presented, the discussion will be considered to be at the CONCEPT level.

Sometimes a class discussion will focus on a particular object representing a class of objects such as microscope or a short story. Although the discussion refers to this particular item, the focus of the discussion centers on the class of objects. Such a topic will be labeled CONCEPT.

C. GENERALIZATION Level

The differentiation between the CONCEPT and GENERALIZATION is difficult since the line to be drawn across many actual levels of abstraction is an arbitrary one. The following criteria are used to determine the presence of GENERALIZATION.

1. Two or more concepts are involved. The topic focus thus represents a complete sentence or a statement in a logical sense.

   EXAMPLES:

   Great men made history.
   Frustration breeds aggression.
   Water seeks its own level.

The presence of DATA in the topic focus (i.e., Thomas Jefferson was a great president.) automatically eliminates this topic from consideration as GENERALIZATION.

2. These concepts are interrelated either as a set of component parts in a system (i.e., the transportation system, the number system, the balance of trade, etc.) or as part of a larger generalization.

3. The topic focus in a GENERALIZATION is on a large idea having broad applicability. Another way of expressing this point is that the concepts making up the GENERALIZATION do not themselves have concrete referents. (i.e., War is Hell; As pressure increases, the volume of a gas decreases; Great novels deal with deep human emotions, etc.)

Each of these three criteria are necessary but not sufficient conditions for GENERALIZATION. All three must be present.

GENERALIZATION--Special Issues.

a. An emphasis on a piece of a system without focusing on the system itself would not be GENERALIZATION.

CONCEPT	GENERALIZATION
The nature of the presidency.	The balance of powers within the federal system.
A description of an electron.	The nuclear system -- electron, proton, neutron, etc.

b. A GENERALIZATION representing as it does high level mental functioning cannot be sustained for very long. A topic should be classified as GENERALIZATION if that high level is clearly reached, however briefly during the topic, and that GENERALIZATION can be considered as the topic focus.

EXAMPLE:

> In a discussion of seaports on the Atlantic Ocean someone remarks how important it is to be on a body of water since all major metropolitan areas are on or close to navigable water. (This GENERALIZATION would be the topic focus since what has preceded could clearly be subsumed under it even though it is a small part of the total topic.)

c. GENERALIZATION may be noted as appearing as an upward conceptual step in the discussion. One may move from the weather patterns of a specific region to weather systems in general, or from photosynthesis to energy transfer or from multiplication problems to a discussion of the changing of number bases.

d. If through explicit statement, an implication is drawn from a GENERALIZATION, it will be categorized on the GENERALIZATION level despite the lower conceptual focus involved. (i.e., If man is evil, then we need a larger police force in our town.)

__EXAMPLES__:

__CONCEPT__	__GENERALIZATION__
A discussion judging whether we are doing a good job in choosing a president.	If we accept the idea that Great Men Make History, what does this imply for our choice of a president?
Possible changes in future farming practices.	Population growth will continue to reduce the number of persons engaged in farming.

III. Discussion Style

The manner in which the topics are dealt with represent a potentially important aspect of teacher-student interaction and is the third major dimension in the system. In this dimension we can see the various thinking operations in action in classroom discussion.

A. DESCRIPTION

The focus of these topics is in describing, defining and, sometimes, in illustrating. The essence of the topic often answers, or tries to answer, the questions what, who, where, when. It is an attempt to draw boundaries around the set of actions, ideas, or entities under discussion.

Illustrations or specific examples are most often used as part of the descriptive material on an idea or incident. They often do not expand the set boundaries so much as they flesh out the existing boundaries by providing examples of set membership.

EXAMPLES:

DESCRIPTION DATA

A description of Lincoln's tomb not explicitly related to any concept or generalization.

Instructions on how to use a particularly idiosyncratic spectroscope prior to collecting data for an experiment. (Remember: Data topics almost always have concrete referents.)

DESCRIPTION CONCEPT

Discussion of the characteristics essential to the American provinces being called colonies.

Discussion of the definition of a simple machine.

DESCRIPTION GENERALIZATION

A discussion to the effect that the scientific method really represents a recognition of the fallibility of human perception and attempts to control for human bias as much as possible.

A discussion focusing on Newton's second law and its meaning.

B. EXPLANATION

This category is used when the focus of discussion is on a deductive sequence of thinking, where the end product or conclusion is an inevitable end product from the premises. In the classroom this is rarely presented in a classic or formal sense but can be recognized if the judge looks for the deductive reasoning. (Exception: Drawing a conclusion from a hypothetical example can be deductive reasoning but will be classified EXPANSION.)

EXAMPLES:

Discussion of the reason why Lincoln delayed issuance of The Emancipation Proclamation. (DATA-EXPLANATION)

Discussion of the sequence of steps needed in a good golf swing. (CONCEPT-EXPLANATION)

The students are performing experiments using an electroscope. Several students tell Jim step-by-step why his electroscope did not function properly when he used it. (DATA-EXPLANATION)

Explanation of what happens when photosynthesis occurs in a green leaf. (CONCEPT-EXPLANATION)

Considering the proposition that "Great men make history", the class discusses that one way to disprove the proposition is to find an ordinary man who made history. (GENERALIZATION-EXPLANATION)

Balancing a chemistry equation or calculating the answer to a mathematics problem. (DATA-EXPLANATION)

C. EVALUATION-JUSTIFICATION

This category is used when a judgment or decision is made and justified. The criteria used for the judgment are implicit. The judgments or decisions are made by individuals on the basis of individual or unstated standards. The decision can be along the dimensions of truth-untruth, good-bad, important-unimportant, correct-incorrect, etc. The key factor is not the dimension being asked for but that a decision or choice must be made that excludes all other choices. A probability statement or request (i.e., The chances are high that America will retain its influence in Asia.) fits this definition of evaluation.

EXAMPLES:

The students discuss that photosynthesis is very important to mankind and why.

The class decides they should have a student council and discusses the reasons for this decision.

The class discusses the problem of Red China and the U. N. They take the stand that Red China should be admitted to the U. N. and justify this stand.

A student spends some time telling why he likes abstract art.

The best method for cracking petroleum and the reason why this method is best is discussed.

D. EVALUATION-MATCHING

This category is used when there is a judgmental question or decision and criteria are explicit. The discussion is focused on matching events or instances to criteria. The act of categorization, provided the criteria for the categories are made explicit is also considered evaluation-matching. As above, the criteria may deal with factual matter or qualitative judgment. The key element is the request or statement matching ideas or instances to a set of criteria.

EXAMPLES:

> A class judges their own school building in terms of criteria for good fire prevention and defend their judgment.
>
> Having previously established rules for a good book report, the class now compares whether a book report given matches up.
>
> Jones is a good mayor because he meets the criteria we established for the position -- honest, intelligent, sensitive, etc.
>
> In view of the evidence we have collected, what do you say now regarding the validity of the law, "Water seeks its own level."
>
> The class takes a portion of their categories of the needs of a family (food, clothing transportation, recreation, etc.) and decides which ones are supplied by a bicycle, an extension cord, etc.
>
> Is an amoeba an animal when it is compared against the dictionary definition of animal?

E. EXPANSION

The focus of these topics lie in a distinct shift or broadening or amplification in the subject matter under consideration. It broadens the scope of the subject through additional associations of concepts or ideas. This may be done through:

1. Comparison or contrast of topic with other concepts or the application of ideas to a new and different problem.

   EXAMPLES:

   Drawing comparison of light waves with sound waves.

   Contrasting religious influence in government during the tenth and twentieth centuries.

   If hunger makes men aggressive, then peace may depend more on farmers than upon diplomats.

2. Presenting a hypothetical set of circumstances and being asked to project an implication or supposed result.

   EXAMPLES:

   What might happen if all electricity went off in central Illinois?

   If women had had suffrage during the Revolutionary Period, how might things have been different?

3. When discussion moves from one medium of expression to another in dealing with the same subject matter.

   EXAMPLES:

   We have talked about the political divisions in South America, let's look at the globe and see if we can find climatic and elevation information as well.

   Moving from a semantic discussion of a mathematics problem to a drawing or symbolization of the problem on the blackboard.

Special Rule: When there is a comparison or contrast between two generalizations or concepts or things within a topic, there also may be evaluation and explanation present. Nevertheless EXPANSION will take precedence in such a case!

EXAMPLES:

Comparing Jackson and Jefferson as strong presidents.

Discussing the relative efficiency of two different methods of petroleum refining.

LEVELS AND STYLE EXAMPLES IN THE CONTENT DIMENSION

	DATA	CONCEPT	GENERALIZATION
ESCRIPTION	A detailed description of the Pilgrim's journey.	The American Colonies' trading policies with the mother country.	In all colonial relations, the mother country exploits the resources of the colony.
XPLANATION	Explaining why the Pilgrims felt they had to leave England.	Showing the sequence of events by which the goods were exchanged.	How would this rule apply to the Philippine Island?
EVALUATION JUSTIFICATION	Were the Pilgrims justified in leaving England? Why?	Which of the mother countries had the most lenient policies toward their colonies? Why?	A discussion generated by the question, "Do you think anybody enjoys Communism?" Communism, as a system of government, is discussed in explaining the individual's opinion.
EVALUATION MATCHING	Discussion of whether Hemingway's short story, The Snows of Kilimanjaro is a good short story as matched with the characteristics of a good short story given in the textbook.	Is ESP a proper study for psychology? Using criteria for psychology as a science for judgment?	Is the public transportation system in a given city adequate for the needs of the people as they are exemplified by a survey of traffic flow?
EXPANSION	Suppose the Pilgrims had landed in Virginia what might have happened?	Comparing trade policies of colonia days and today.	Predict our trade relationships with our Martian colonies.

LEVELS AND STYLE EXAMPLES
IN THE SKILLS DIMENSION

	DATA	CONCEPT
DESCRIPTION	Discussion concerning the organization of a new social studies textbook prior to the students' use of the book.	The description of a telescope and how it is used in an astronomy class before students make their own observations.
EXPLANATION	Information on how to use a particular golf club that has some idiosyncracies to it.	The teacher or class discusses how one checks historical data with emphasis on the student eventually doing it.
EVALUATION JUSTIFICATION	Before a chess game, a student states his opinion that Chess Ideas for Young Players is the best book he has seen on chess and tells why he believes this.	The class decides which of two sets of encyclopedias are best in supplying information for reports and justify their choice. The students then begin to prepare reports.
EVALUATION MATCHING	Students criticize reports from a recent field trip with criteria previously developed.	Before beginning a series of experiments, the class discusses whether the melting point should be recorded at the beginning or end of the process.
EXPANSION	The class compares two globes in the classroom on how the interpretation of data must differ for each.	The class discusses the various possible ways they might express data in a sociological experiment.

EXAMPLES OF GENERALIZATION IN THE SKILLS DIMENSION

	GENERALIZATION
DESCRIPTION	The teacher defines the scientific method as a means of testing hypotheses prior to the students' beginning such testing.
EXPLANATION	Teacher explains how the scientific method the students are learning enables knowledge to grow and expand.
EVALUATION JUSTIFICATION	A student tells why he objects to the Palmer Method of Handwriting immediately before a writing lesson.
EVALUATION MATCHING	The students discuss how they can use criteria to evaluate the appropriateness of various decisions in the political arena.
EXPANSION	The class compares the Socratic method to the scientific method to see how the different systems agree and differ with a view towards which approach the students should take.

IV. Auxiliary Categories

There are a number of auxiliary categories which do not fit into the general scheme or model but which are necessary components of classroom behavior. A brief description of these follows.

A. Management (Not Coded)

The essence of Management activity is that it concentrates on arranging the environment for learning. This is done through quieting the class, arranging the temperature or seating arrangements, taking attendance, giving dates for assignments, etc. Included in Management is incidental verbal byplay between students, or teacher and students, often occurring at the beginning of the class session before the class actually gets down to business. Segments of a topic that are rated Management are bracketed and not included in any quantification of that topic.

EXAMPLES:

Teacher discusses a popular TV show unrelated to lesson with a few students while waiting for class to settle down.

Announcement comes on the school public address system about the Senior Prom in the middle of class and there is some resultant verbal byplay.

An argument arises about the accuracy of the TV weather forecaster.

There is trouble finding the erasers and the class is delayed in starting.

B. Structuring (Coded 007)

This type of activity deals directly with the process of sequence of the class activities that are content oriented. It is the engineering phase of the class discussion determining what the class is going to do next or what they might do tomorrow.

In any particular topic there are present a large number of possible alternatives which represent the next move in the sequence. The discussions which revolve around what should be the next move or how this next move should be accomplished, is structuring unless explicit mention is made that the students are expected to learn this sequence of activities as part of the lesson, in which case it would be categorized SKILLS.

Since this is an integral part of any class operation, it is taken note of only if it reaches 15 lines in length!

EXAMPLES:

Students are getting ready to write a short essay in class and the teacher gives lengthy instructions on precisely how it will be done.

Students are about to role play and the scene is set for them by the teacher and other students.

Some structuring often occurs at the beginning and end of class sessions. If these are not 15 lines in length, they are merely ignored and considered a part of the associated topic. If there is no associated topic then it is ignored and not counted as part of any topic.

C. Activity (Coded 106 or 206)

This category is used when there is a period where students are actively engaged in some Activity such as carrying out a research project, doing math exercises, role playing, or extracting topic sentences during class time. This Activity should last for at least two minutes to be classified. This would bring it in line with the average length of other topics where verbal interchange is the focus of action. In this situation, there are likely to be more individual conversations. The group discussion pattern may be abandoned or deferred for a set period of time. Whether Activity is classified as SKILLS (206) or CONTENT (106) depends on how thoroughly the Activity has been identified as part of a deliberate intent to increase the skills competencies of the student. Since there is often little conversation in an Activity topic, the content of the theme should determine which of the two it should be.

EXAMPLES:

Teacher gives explicit indication that conducting an experiment will aid the students in becoming better scientists (Activity-SKILLS).

Teacher uses student data collected by experiment to make a specific point (Activity-CONTENT).

The following examples indicate the differences between auxiliary categories.

Management	Structuring	Activity
Class seating arrangement is being changed to prepare for watching closed circuit TV program.	Teacher gives extended directions on what they are to watch for the TV program.	The observation period where the students watch the TV program.
Students are asked to get equipment ready for experiment they will conduct.	The teacher explains which equipment is to be used in collecting data.	The class members are actually conducting the experiment.
Class is asked to get out themes that they had been working on.	Teacher gives instructions on the way in which the themes will be treated in this session.	Students work quietly at desk in individual critique of themes.

Coding System for Classification of Topics

The code is a three (3) digit number to correspond to the three dimensions of the classification system.

The first division is between CONTENT and SKILL and this would be classified and coded in hundreds' column. The second is the level of conceptualization and this would be coded in the tens' column and the third is style which would be in the ones' column.

The codes are

1 = CONTENT
2 = SKILLS

0 = No determinable level (undeveloped topic)
1 = DATA
2 = CONCEPT
3 = GENERALIZATION

0 = No determinable style (undeveloped topic)
1 = DESCRIPTION
2 = EXPLANATION
3 = EVALUATION-JUSTIFICATION
4 = EVALUATION-MATCHING
5 = EXPANSION
6 = Activity
7 = Structuring

EXAMPLES:-

A CONTENT topic at the CONCEPT level and in the EXPANSION style would be coded 125.

An undeveloped skills topic at the DATA level would be 210 — if the level could not be determined it would be 200.

A topic on Structuring is called 007.

An Activity topic is coded 106 (content) or 206 (skills).

V. Distinctions between Style Categories.

A. DESCRIPTION vs EXPLANATION

When the topic focus centers on the description of a function or process such as the nitrogent cycle, distillation of gasoline or a golf swing, there is a question o distinguishing DESCRIPTION from EXPLANATION. The crucial differentiating factor is whether the functions or processes are merely listed (DESCRIPTION) or whether a sequence of interacting steps is provided (EXPLANATION).

EXAMPLES:

DESCRIPTION	EXPLANATION
Listing the causes of World War I.	Suggesting causal relationships for World War I.
The components of the digestive system.	Describing the digestive system with emphasis on interrelating parts.

B. DESCRIPTION vs EVALUATION-MATCHING

The point of greatest similarity between these two categories comes when criteria which will provide a basis for judgment are discussed. When there is a mere listing of the criteria this is DESCRIPTION but when there is an actual matching operation taking place then this is EVALUATION-MATCHING.

EXAMPLES:

DESCRIPTION	EVALUATION-MATCHING
The characteristics of a good leader.	The determination whether Mr. X meets that criteria.

The determination of the criteria for a relevant experiment.	The categorization of a series of experiments into relevant and irrelevant.

C. EVALUATION-JUSTIFICATION vs EXPLANATION

In both of the above categories the topic focus is on rational arguments or justifications. In EVALUATION-JUSTIFICATION there is, in addition, a decision or judgment that is an important part of the topic focus.

EXAMPLES:

EVALUATION-JUSTIFICATION	EXPLANATION
Lincoln was a great president because...	The reason why Lincoln was a great president...
The chances are slim that Mr. Johnson will win the election because of his civil rights attitudes.	Why Mr. Johnson will not be elected.
Estimation of an answer from several given alternatives.	The calculation of the answer to a problem.

D. EVALUATION-JUSTIFICATION vs EXPANSION

Since EXPANSION represents a broadening of the points under discussion it takes precedence over other categories if one of the three criteria for its existence are satisfied.

1. A comparison of two equal (on an abstraction level) entities.
2. A hypothetical or make believe example.

3. A change from one medium of expression to another (as in semantic to symbolic).

EXAMPLES:

EVALUATION-JUSTIFICATION	EXPANSION
Giving and justifying an opinion on Grecian art.	Comparing the artistic merits of Greece and Rome.
Estimating the possibilities of NATO disbanding.	What might happen if NATO would disband.
Discussion of the correctness or incorrectness of the formula.	The translation of a chemical or mathematical formula to linguistic terms.

E. DESCRIPTION vs EXPANSION

The point of greatest issue between these two categories is when concepts are being interrelated. If the emphasis is on the system of which the relationship is a part then it is a DESCRIPTION of the system. If it is a comparison of two components of the system then it is EXPANSION.

EXAMPLES:

DESCRIPTION	EXPANSION
The transportation system of New York City.	A comparison of bus and subway service in New York.
A motivational theory including anxiety and hostility.	A comparison of anxiety and hostility as human motivation concepts.

INDEX

- ACTIVITY
  - definition, 38
  - examples of, 38,39
  - rules for topic division, 11

- AUXILIARY CATEGORIES, 36-39

- CLASSROOM INTERACTION
  - need for study, 1-2

- CODING SYSTEM
  - for topics, 40
  - examples, 40

- CONCEPT
  - criteria for, 22
  - distinguish from DATA, 23, 27, 33-35
  - distinguish from GENERALIZATION, 23, 28, 33-35
  - examples of, 22, 33-34
  - special issues, 23

- CONTENT
  - definition of, 18-20
  - distinguished from SKILLS, 18-20
  - examples of, 18-20, 33

- CONTENT-SKILLS DIMENSION, 18-20

- DATA
  - criteria for, 21
  - distinguish from CONCEPT, 23, 27, 33-34
  - examples of, 21-22, 33-34
  - special issues, 22

- DESCRIPTION
  - definition of, 27
  - distinction from EVALUATION, 41, 42
  - distinction from EXPANSION, 43
  - distinction from EXPLANATION, 41
  - examples of, 27-28, 33-35, 41-43

- EVALUATION-JUSTIFICATION
  - definition of, 29
  - distinction from EXPANSION, 42-43
  - examples of, 29, 33-34, 42-43

- EVALUATION-MATCHING
  - definition of, 29-30
  - distinction from DESCRIPTION, 41-42
  - examples of, 30, 33-35

- EXPANSION
  - distinguish from EVALUATION-JUSTIFICATION, 42-43
  - distinguish from EVALUATION-MATCHING, 32
  - distinguish from DESCRIPTION, 43
  - examples of, 31-32, 33-35

- EXPLANATION
  - definition of, 28
  - distinction from DESCRIPTION, 41
  - examples of, 28, 33-35
  - related to EXPANSION, 28

- GENERALIZATION
  - criteria for, 23-24
  - distinguish from CONCEPT, 24, 26, 28, 33-35
  - distinguish from DATA, 24, 33-35
  - examples of, 23-25
  - special issues, 24-26

- LEVELS OF ABSTRACTION, 21-26

- MANAGEMENT
  - definition of, 36
  - examples of, 36, 39
  - rules for topic division, 11-12

- MODEL
  - examples of categories, 33-35
  - figure of, 9
  - overview, 2-5

SKILLS
   definition of, 18-20
   distinguished from CONTENT, 18-20
   examples of, 18-20, 34-35

STRUCTURING
   coding of, 12
   definition of, 37
   examples of, 37, 39
   topic division of, 12

STYLE DISTINCTIONS, 41-43

SUBDIVISIONS OF DISCUSSION, 6

SUMMARIES
   how treated, 17
   topic division, 13

SYSTEMS IN GENERALIZATION, 23-24

THEME
   definition of, 15-16
   examples of, 16

TIME
   factor in topic division, 6, 10

TOPIC
   definition of, 6
   embedded, rules for, 10-11
   labeling of, 8, 14-15
   length of, 10
   rules for return to, 8, 17
   sample coding sheet, 9

TOPIC DIVISION
   criteria for, 6-14
   examples of, 7, 8, 13

TOPIC FOCUS
   criteria, 14
   examples, 14-15

TOPIC -- UNDEVELOPED
   criteria, 10
   merging with other topics, 11
   special cases, 10-11

TRANSFORMATION
   from one content area to another, 31-32

APPENDIX B

CLASSIFICATION OF TOPIC TRANSITIONS

CLASSIFICATION OF TRANSITIONS FROM ONE TOPIC TO THE NEXT TOPIC

The classification of topic transition encompasses both how the topic is initiated and how the topic is terminated. This requires that two separate analyses be conducted.

I. Analysis of Topic Initiation

To analyze the type of topic initiation, read only the first one or two paragraphs of the topic under inspection.

The five categories listed below represent five ways that a topic may be initiated. Enter the number of the appropriate category in column I on the data sheet, next to the letter of the topic under inspection. Do not classify the topic initiation for the first topic of a tapescript - leave that classification cell blank.

The categories of topic initiation are:

#1. Student Inquiry

If the topic is initiated by a student's question, choose category #1.

Example:
T: ... and another colony founded by the Spanish was St. Augustine.
Bob: What colonies did the English establish?
T: The English founded a colony at Plymouth, Mass., in the year....

#2. Teacher Inquiry

If the teacher initiates the topic by asking a question, choose category #2.

Example:
T: ...so besides ground and navel forces of various types, the air force also helped the allies win World War II. How do you think the air force would influence a war on the moon?
Bob: Since there is no air on the moon, conventional aircraft couldn't fly and therefore...

#3. Student Introduces New Information

If a student makes a statement which initiates the discussion in the topic, choose category #3.

> Example:
> T: ...and Saturn has many large rings around it.
> Bob: Although Saturn is a big planet| it is not as large as Jupiter.
> T: True, and Jupiter is actually the largest planet. Jupiter's atmosphere is composed of ...

#4. Teacher Introduces New Information

If the teacher makes a statement which initiates the discussion in the topic, choose category #4.

> Example:
> Bob: ...and Brazil is also one of the largest South American countries.
> T: All right, now let's move on to Peru. Peru is found ...

#5. Miscellaneous Topic Initiation

In rare cases where the topic is not begun by a student question, teacher question, student introduction of new information, classify the topic initiation as #5. One such instance would be the initiation of a structuring topic, where there is no initial statement of information dealing with subject matter.

> Example:
> Bob: ...and Columbus finally reached the New World.
> T: Just a minute. I notice that very few of you people are taking notes on Bob's report. Everytime you come to this class you should bring a notebook and pencil. As the person speaks, you should ....

FOR CONTENT TOPICS, an initiating question (#1 or #2) or an initiating statement (#3 or #4) must pertain to content. If the question or statement pertains primarily to skills or structuring, classify the topic initiation as #5 (Miscellaneous).

FOR SKILL TOPICS, an initiating question (#1 or #2) or statement (#3 or #4) must pertain to skills. If the question or statement pertains primarily to content or structuring, classify the topic initiation as #5 (Miscellaneous).

FOR STRUCTURING OR ACTIVITY TOPICS, classify the topic initiation as #5, unless the topic initiation deals with content (if this is the case choose whichever category applies #1, #2, #3, or #4).

II. Analysis of Summary in Terminating Topic

To analyze the type of summary, read the last two paragraphs of the terminating topic and see if a summary statement of that topic is present.

The three categories listed below represent the three possible results of the analysis for a summary statement in the terminating topic. They are presented in a descending hierarchy, i.e., the most sought after category for classification purposes is listed as #1 and the least sought after is listed as #3. If a summary statement seems to fall into two of the categories, place it in that category which is uppermost in the hierarchy (e.g. choose #1 rather than #2, when both seem to apply).

Enter the number of the appropriate category in Column II on the data sheet, next to the letter of the TERMINATING TOPIC. Do not classify the summary of the final topic of a tapescript - leave it blank.

The categories for analyzing summaries in terminating topics are:

#1. Student Summary of Terminating Topics

If a student summarizes the terminating topic, choose category #1. THE SUMMARY STATEMENT SHOULD RESEMBLE THE TOPIC NAME ON THE DATA SHEET.

Example:

T: ... and so nitric acid also contains the element hydrogen.
Bob: Then we could say that all acids contain Hydrogen.
T: Right, Bob. Now let's talk about salts. The most common form of salt is sodium chloride, which ...

Example:

(NOTE: If a student originally summarizes the topic and the teacher reiterates the student's summary, the shift is categorized as #1, not #2.)

Al: ... and inorganic matter is matter that has never been alive.
Bob: Am I right in saying that there are only two kinds of matter, organic and inorganic?
T: Correct, Bob. The two kinds of matter are organic and inorganic. Now let's discuss energy, energy is...

#2. Teacher Summary of Terminating Topic

If the terminating topic is summarized by the teacher, choose category #2. Be sure the teacher has summarized the topic, rather than the previous student's statement. (A TOPIC SUMMARY SHOULD RESEMBLE THE TOPIC NAME ON THE DATA SHEET.)

Example:
Bob: ... and not only Pizarro, but also Cortes was primarily interested in exploring the New World to find gold.
T: Yes, unlike the French, the Spanish explorers' main interest in the New World was to find riches. The English explorers came to America for still another reason, which was...

#3. No Summary of Terminating Topic
If there is no summary statement of the terminating topic, enter #3 in column II on the data sheet. Note that a topic belongs in this category if the teacher summarizes only the statement of the last student who spoke (rather than summarizing the entire topic, which would indicate that the category was #2).

Example:
= a topic with the focus "Founding of Jamestown"

Bob: The founder of Jamestown, John Smith, was very respected because he was tall, strong, fair to the colonists, and had lots of money.
T: Yes, John Smith was an able and respected leader. Now let's discuss the founding of the colony at Plymouth, Mass. Plymouth was ...

FOR CONTENT TOPICS, a summary must pertain to content to be classi-
fied as #1 or #2. Any summary pertaining primarily to skills will be classified as #3.

FOR SKILL TOPICS, a summary must pertain to skills to be classified as #1 or #2. Any summary pertaining primarily to content will be classified as #3.

FOR STRUCTURING OR ACTIVITY TOPICS, all topic terminations will be classified as #3.

Rather than merely reading only the last two paragraphs of a topic to determine the terminator category, instead begin reading one quarter of the page above the topic division line and read from there to the division line.

(EFFECT OF TOPIC RETURN ON CHOICES OF INITIATOR AND TERMINATOR)

INITIATOR: To determine which initiator category to enter on the data grid when there is more than one topic with the same letter (i.e. topic return), choose the initial initiator, i.e. the topic's initiator when the topic appeared for the first time.

TERMINATOR: For topic returns, choose the terminator category which is highest in the hierarchy.

Example: The first time topic F appears in the script, the teacher makes a summary statement (termination category #3). Later there is a return to topic F but there is no summary statement (termination category #1).

For recording the termination category for topic F, choose termination category #3 since it is higher in the hierarchy than termination category #1 (cf. p.9, next-to-last paragraph).

SAMPLE CLASSIFICATION OF TOPIC TRANSITION

(Assume the following topic occurred sometime in the middle of the class session and during topic classification it had been assigned the code letter B.)

T: Well, that completes our discussion of Peru.
Bob: Let's talk about Brazil. That's where the Amazon River is.
T: Yes, and Brazil is also known for the fact that it is the largest country in South America.

- Class discusses Brazil -

Sue: ...and so the seasons in the areas in the region Brazil has a varied climate.
T: Brazil is a large country with lots of jungles and rivers, the capital is Rio de Janeiro, which is a popular resort, and the climate is warm and humid. Now let's leave Brazil and go on to Chile. Chile is ...

Since Bob initiated the topic by mentioning Brazil and the Amazon River, the initiator category is #5. The teacher terminated the topic by summarizing the important characteristics about Brazil, so that the termination category is #3.

TOPIC	I	II
:	:	:
:	:	:
B	5	3
:	:	:
:	:	:

Active Vs. Passive Students.

Since it did seem to take initiative on the part of the student to begin a topic himself or herself, a separate analysis was conducted on the different characteristics of students who were active (i.e., initiated topics) and those that were passive (i.e., did not begin any topics). The measures used were those obtained through the previous study and included measures of intelligence, divergent thinking ability, measures of self concept, attitude, and teacher ratings on cognitive and sociability.